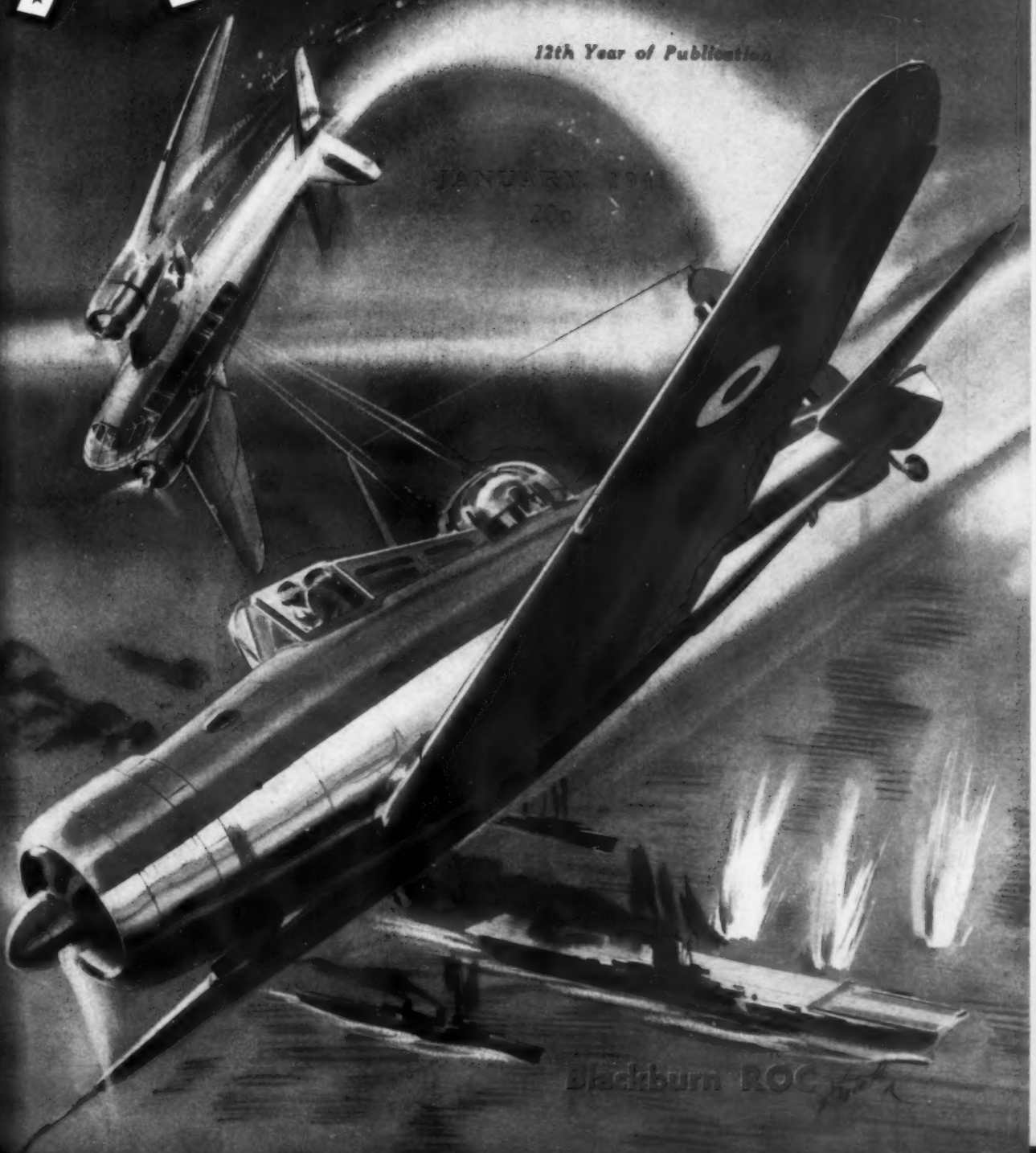
MODEL AIRPLANE NEWS

12th Year of Publication

JANUARY 194
20c



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MODEL AIRPLANE CEMENT
QUICK DRYING
VERY STRONG
CRYSTAL CLEAR
LIGHT WEIGHT

BIG, NEW DOUBLE-SIZE TUBE 5¢
(Holds 1 Full Oz.)
SHOWN ACTUAL SIZE

TESTOR CEMENT CO., "The House of Adhesives", ROCKFORD, ILL.
World's Largest Manufacturers of Model Airplane Chemicals

SUPER-CYCLONE

"G" SERIES AIRPLANE ENGINE
DUAL IGNITION
$15

The Ideal Xmas Gift

AN ENGINE is the finest gift a model-builder can receive. BUT . . . his pleasure at receiving it and his satisfaction in its operation for months to come depend on its quality of construction and its ability to perform under the most exacting conditions. SUPER-CYCLONE is the world's finest and most complete engine, with more outstanding engineering features than any other on the market. The "G" SERIES Airplane Engine and the "G-R" SERIES Race Car Engine are adaptations of the same great engine—each engineered to give peak performance in its respective field—both are the ultimate in precision construction.

★ In the Airplane field, the winning of a SINGLE meet can be due as much to fortunate air conditions as to the engine, but when SUPER-CYCLONE powered ships win the Class "C" events in EIGHT MAJOR MEETS, in all parts of the country, it is conclusive proof of superior engineering!

★ The final test of design and stamina is in Race Car performance, and on the nation's most famous tracks SUPER-CYCLONE stamina withstands the gruelling punishment of high R.P.M. And as for speed—On November 10 at Santa Barbara, BERT HANNIGAN of Van Nuys established a new WORLD'S RECORD of 74.56 M.P.H. for the half mile in the officially sanctioned A.M.R.C.A. Western Regional Meet with his new SUPER-CYCLONE powered "Interceptor" car. In the same race FRANK H. (Cyclone) LAIR of Santa Maria took second with his SUPER-CYCLONE and also broke the previous world's record by doing 73.05 M.P.H. In the mile race, BOB HOLLOWAY of Van Nuys surpassed the previous official all time speed record by doing 75.88 M.P.H. with his SUPER-CYCLONE.

You Can't Buy a Better Engine Than the World's Record Holders!

A 50% Discount for You!

Early in the beginning of our long experience of manufacturing and selling miniature engines, we formerly sold through dealers, but since we had to give the dealer 50% and in some cases more in the form of discounts, we decided to sell only direct from the factory and give this 50% discount to you as a saving. By buying SUPER-CYCLONES direct from the manufacturer, you get a $26.00 engine for only $13.00, or a $32.00 engine for $16.00. THUS YOU ARE ABLE TO BUY SUPER-CYCLONE AT ½ PRICE!

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We introduced the hollow rotary crankshaft principle and dual ignition system to the miniature field. The ignition system is an adaptation of the principle used in millions of the finest automobiles. It has always been one of our precision shop practices to manufacture pistons and cylinders as individually lapped units. Our aluminum die castings are the finest the world produces.

COMPLETE AND READY TO INSTALL—There are no extras to buy. TYPE: Two stroke cycle. Two port rotary admission valve. Transfer integral with cylinder. Every engine thoroughly tested, given full throttle run, and fully guaranteed. "G-R" SERIES RACE CAR ENGINE: Complete and assembled with flywheel, 24 S.T. Duralumin connecting rod, spark coil, condenser and metal fuel tank. Bore 29/32", stroke 15/16". Displacement 10 c.c. "G" SERIES AIRPLANE ENGINE: Complete and assembled with spark coil, condenser, transparent fuel tank and engine mounts. 1/5 to 1/4 hp. Bore 15/16", stroke 15/16". Displacement .647 cu. in. Weight [illegible] 7 1/2 oz.

THE "G-R" SERIES
10 c. c. RACE CAR ENGINE
SINGLE IGNITION
$14

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Barney

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Each model packed in box printed in 3 colors with picture of the model it contains. Dealers please note.

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(No Ceiling)

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$1.50

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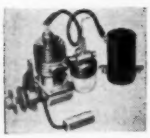
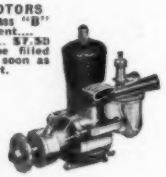
Model "D" $12.50
Model "C" $18.50
Model "B" $21.50
Model "M" $16.50

OHLSSON "19"
Class "A" .19 Displacement. Just right for Miss Tiny $14.50



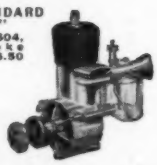
JUNIOR MOTORS BROWNIE Class "B" .29 Displacement..... $7.50
Orders will be filled in rotation as soon as deliveries start.

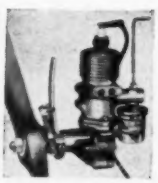
OHLSSON "23"
Class "B" .23 Displacement. Just right for Sky Baby $16.90



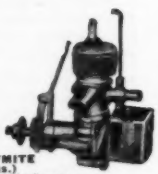
"O.K." STANDARD Class "C"
Displacement .604, Bore and Stroke .900 x .950 $16.50

OHLSSON "60"
Class "C" .60 Displacement For Your Spook 72" ..$21.50





SKY CHIEF Class "C"
Displacement .526, ½ H. P., Base ⅞", Stroke ⅞", weight 10 oz. with condenser and coil
$5.95 Postpaid



DENNYMITE (Illus.)
DeLuxe Airstream, $17.85. Standard Airstream, $15.85. Airstream Unit without Coil and Condenser, $13.85.

"O.K." DE LUXE
Displacement .616. Bore and Stroke .900 x 31/32
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Bore ½"—Stroke ½", Weight 2 oz.
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Super-Cyclone	**O K**
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Hurleman	**Forster**
Sky Chief	**Tiger**

Kit complete with cement, dope, covering, and wheels..... **$3.95**
Plans only 50c.

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It isn't necessary to be an expert to fly the Spook. Spook 48 will take any Class A or B motor and give you a climb equal to anything obtainable from more powerful ships. The glide, well, you will think you put your engine in a high performance sail plane instead of a gas model. May be powered with any Class A or B motor such as

Ohlsson 19	**Syncro B**
Ohlsson 23	**Forster 29**
Brownie	**Madewell**
Bantam	**Torpedo**

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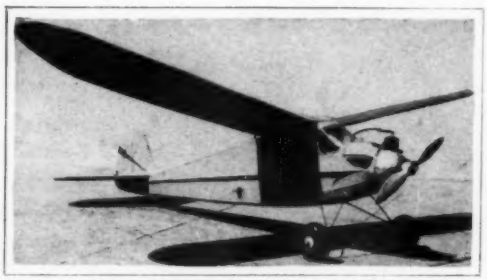
MISS TINY—CLASS "A"



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Dry Kit, without wheels, dope..... **$4.75**
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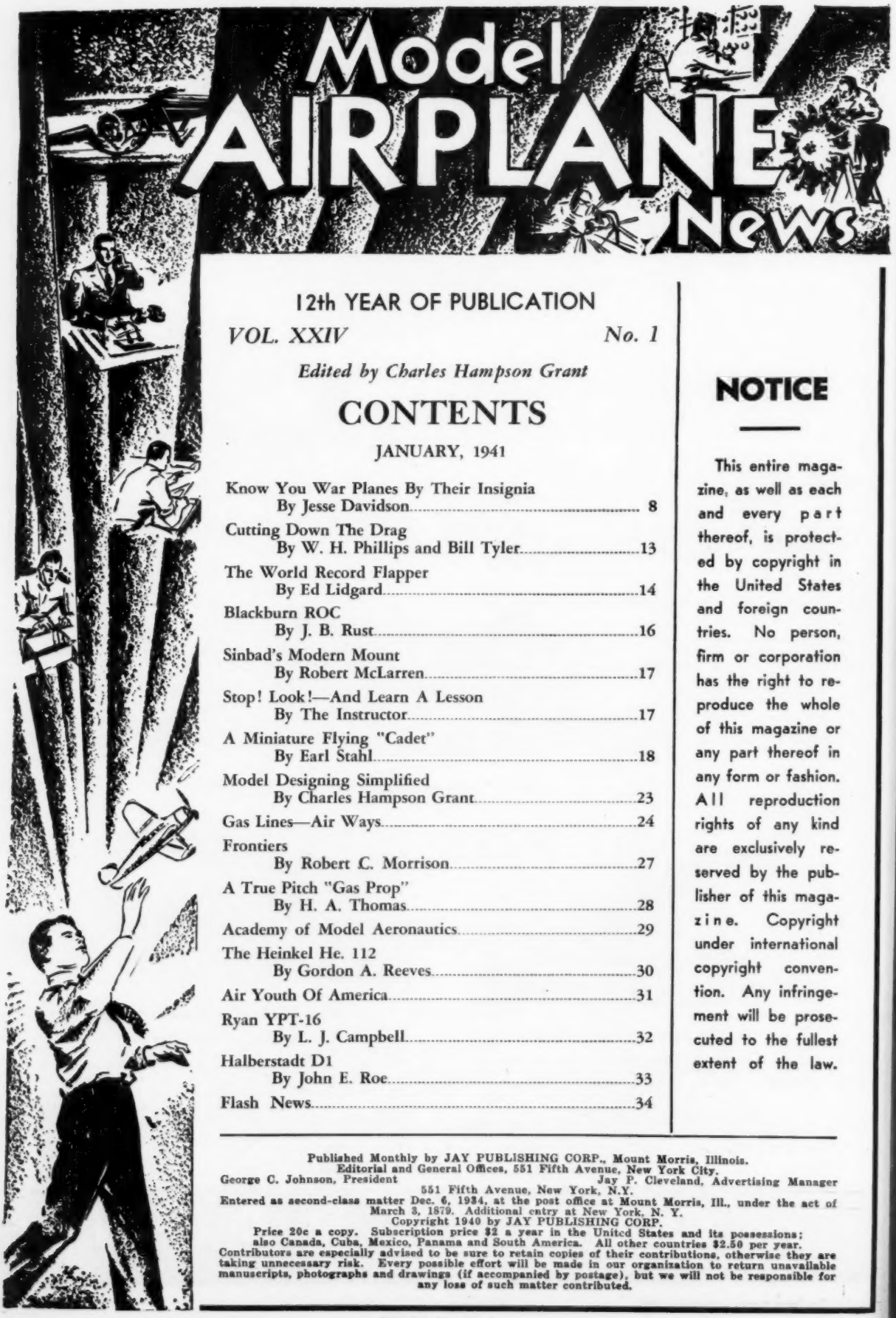
12th YEAR OF PUBLICATION

VOL. XXIV *No. 1*

Edited by Charles Hampson Grant

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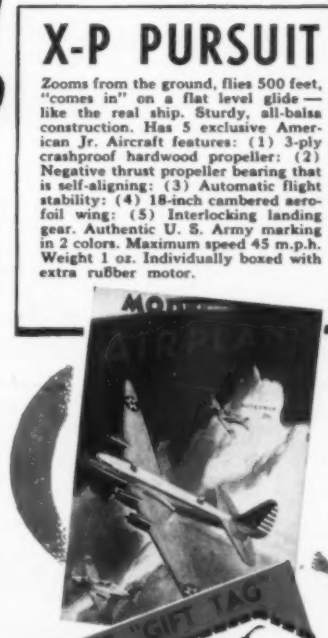

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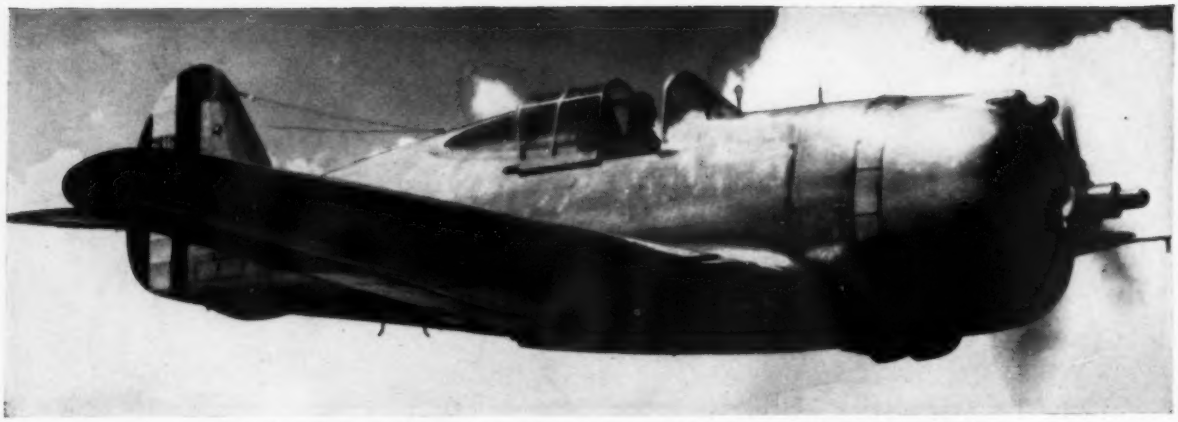


A Curtiss Hawk, used by the French, with blue, white and red stripes on the rudder

KNOW YOUR WAR PLANES

By JESSE DAVIDSON

THE total war has been sealed with the grim destructive terrors of the airplane and the fear and hatred of suffering humanity have been centered in the emblem that identifies the relentless winged destroyer. For it is the cross, cockade, swastika, fascio or other emblems that are now symbols of famine, pestilence, death and devastation. . . .

The system of aircraft identification was developed during World War I and the principle governing the identification markings is that the identity of the planes should be visible from any angle while in flight at the highest possible altitude.

The insignia described herein are those of nations which have been at war during the past several years. Also included are insignia of countries now neutral but whose economic importance threaten to engulf them in the conflict.

Two forms of swastikas on body and rudder of Junkers dive bombers

Red bands of Spanish Loyalists on wings and body of Russian bombers

Great Britain

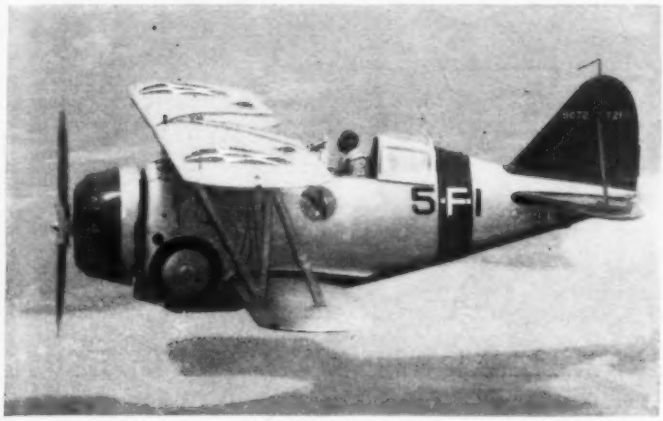
The standard tri-color insignia of the Royal Air Force has been in some cases altered just before the current conflict to indicate the missions of the aircraft bearing them. Since early 1938 the R.A.F. began to paint its machines with a new form of camouflaging known as *"shadow shading."* The familiar red, white and blue "bull's eye" was henceforth seen encompassed by a yellow outer circle and is now in use by all shadow-shaded aircraft, including the day bombers.

The night bombing machines bear bi-colored insignia, the outer circle being blue and the center red. The regular white circle has been eliminated to minimize the possibilities of its being picked up by enemy anti-aircraft searchlight batteries.

Significant also is the reversal of the order of the colors on the rudders of British fighting aircraft. In 1930 the blue, white and red stripes were changed to read (starting from the vertical fin), red, white and blue. This was to prevent confusion with the French rudder markings which were identical to the British during World War I, and up to October 1930. All camouflaged R.A.F. machines in the present war do not carry the rudder

German-made Bulgarian Air Force Planes

Vultee V-11 with insignia of Turkish Air Force



U.S. Navy Section leader with squadron and plane markings

U.S. Air Corps markings on Curtiss P36-A

BY THEIR INSIGNIA

Markings on Modern Warcraft and How You Can Read the Story They Tell

markings despite the use of cockades in one form or another. However, general service planes still carry the tri-colored rudder markings.

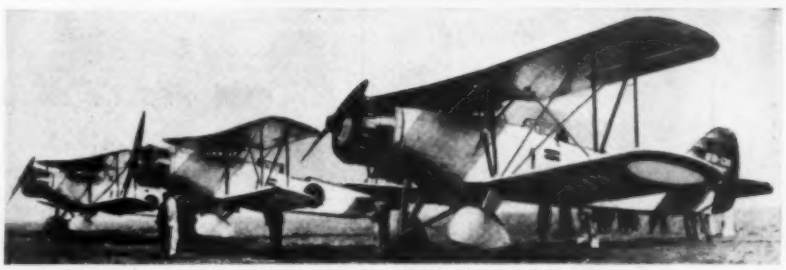
Germany

The German air force as built under the Nazi regime is one unit and has no separate insignia to indicate naval or military aircraft. The white-bordered iron cross, which was the last type used in the first World War is again prominently displayed on Nazi machines and is located on the upper and lower surfaces of the wings as well as both sides of the fuselage. The Swastika is used in conjunction with the cross and is located on the rudder sides. It is black upon a white circular background which is set in the center of a broad red band painted across the entire length of the vertical fin through to the rudder. Another variation of the rudder marking is the Swastika without circle or horizontal band.

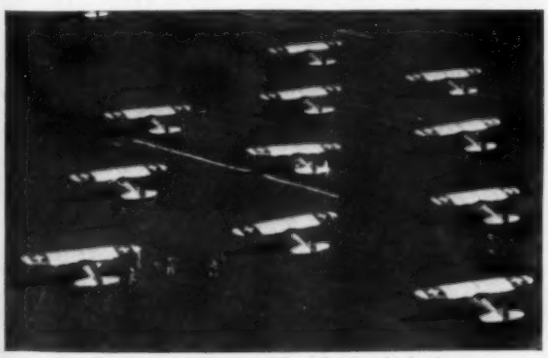
The Swastika, which is one of the most ancient and widespread of all symbols, is considered an old Germanic sign and was adopted in 1919 by the German National Socialist Workers Party on the day of its inception. It was declared as part of the German flag in 1934. The colors of the Swastika Flag are black, white and red, the same colors of Imperial Germany before 1918.

U.S. Navy planes with color bands on cowl; squadron and plane markings on body

Grumman fighters with distinctive Marine Corps rudder stripes

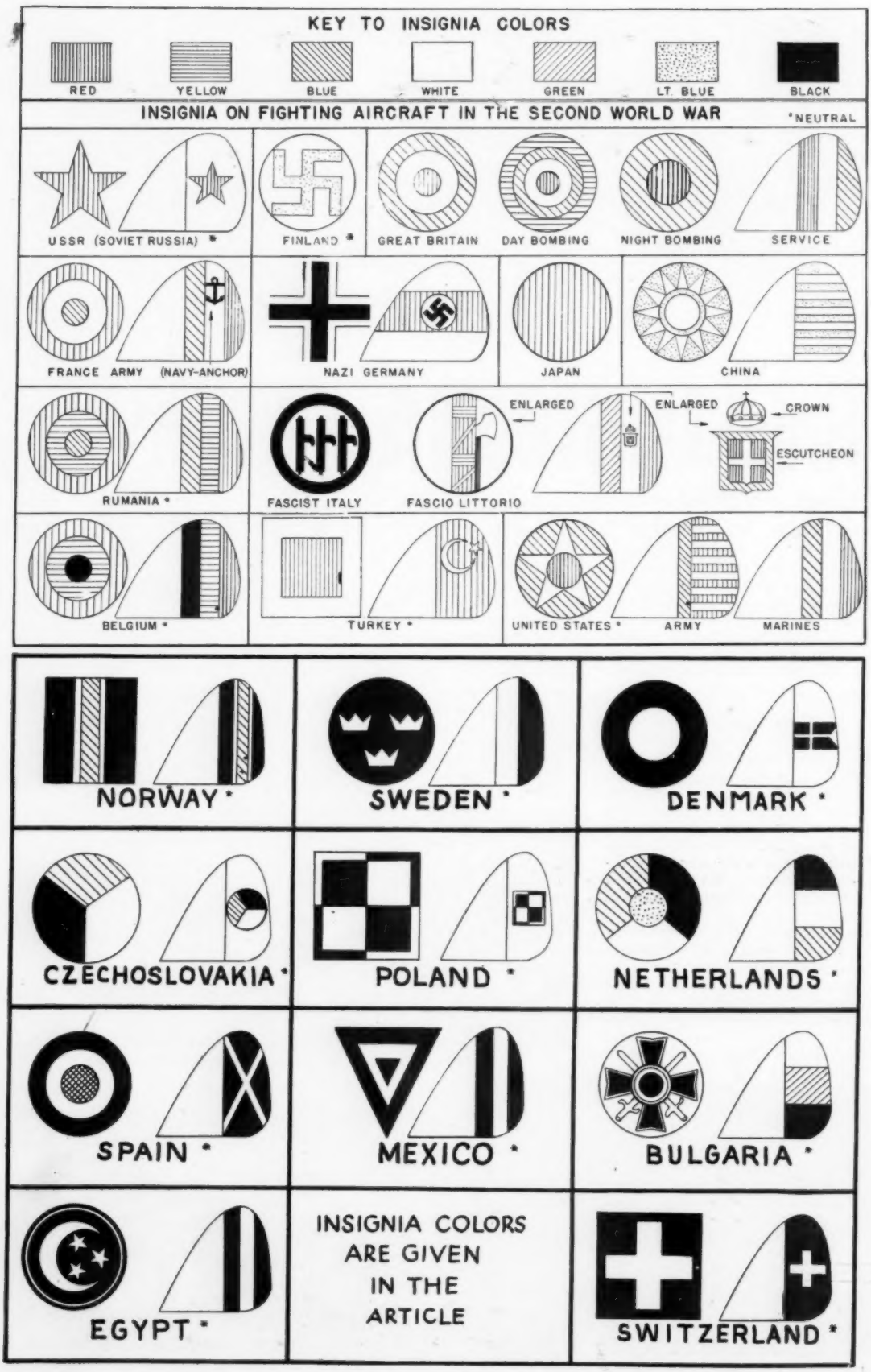


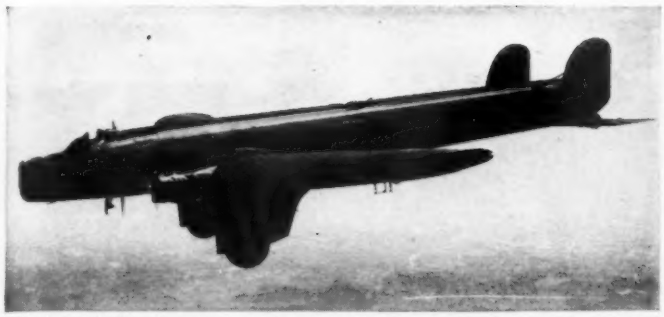
Japanese planes with red ball on wings and fuselages



Swiss army planes with red cross insignia

"Fabric Planes" have yellow wings and tail with blue bodies


KEY TO INSIGNIA COLORS
RED
YELLOW
BLUE
WHITE
GREEN
LT. BLUE
BLACK
INSIGNIA ON FIGHTING AIRCRAFT IN THE SECOND WORLD WAR
*NEUTRAL
USSR (SOVIET RUSSIA) *
FINLAND *
GREAT BRITAIN
DAY BOMBING
NIGHT BOMBING
SERVICE
FRANCE ARMY (NAVY-ANCHOR)
NAZI GERMANY
JAPAN
CHINA
RUMANIA *
FASCIST ITALY
FASCIO LITTORIO
ENLARGED
ENLARGED
CROWN
ESCUTCHEON
BELGIUM *
TURKEY *
UNITED STATES *
ARMY
MARINES
NORWAY *
SWEDEN *
DENMARK *
CZECHOSLOVAKIA *
POLAND *
NETHERLANDS *
SPAIN *
MEXICO *
BULGARIA *
EGYPT *
INSIGNIA COLORS ARE GIVEN IN THE ARTICLE
SWITZERLAND *



R.A.F. night bombers wear a blue and red cockade. The white circle is eliminated to make plane inconspicuous in glare of searchlights

An Italian pursuit plane with new markings. Note Fascia Littorio markings on body

Italy

The familar red, white and green cockade used by the Italian Air Service during the first World War was removed by order of late Air Marshal Italo Balbo early in 1927 because "they were a visible aiming point for enemy machine guns." In its place the *Fascio Littorio* emblem, painted on fuselages and seaplane prows, was made compulsory.

More recently another variation of the *Fascio Littorio* was adapted for wing identification markings. The wing emblem displays three black *fasces* superimposed upon a white background encircled by a black border. This symbol derives its meaning from an old badge of authority carried by the magistrates of ancient Rome. It is best described as a bundle of rods surrounding an axe symbolizing the power to enforce the law through flogging or beheading. In Italy, the *fasces* now stands for the unification of all the nation's forces into a single powerful authority.

The Crown and Stem (escutcheon) used on the white stripe of the tri-colored rudder is the emblem of the Royal House of Savoia (the King's family) and was introduced in 1915.

A plane with red and white checkerboard insignia of Polish Air Force

Japan

The Japanese military aircraft marking is a solid red ball known as the "*Hinomaru*" or red sun which also appears on the national flag. It is found on the wing surfaces and both sides of the fuselage on both naval and military planes. The rudders carry no distinguishing markings.

China

The position of wing insignia on the Chinese National Government planes is identical to U. S. Army Air Corps planes. Rudder markings are similarily placed. The insigne on the rudder covers the entire surface of the rudder back of the hinge line. It consists of twelve equally spaced stripes colored alternately blue and white.

The wing insigne is taken from the Chinese national flag. The blue background represents the blue sky and white signifies the bright sun. The twelve white points are symbolic of the radiant rays of the sun, which also signify the "twelve good characters a person should have"—as believed by the ancient Chinese scholars. The rudder insignia are a version of the wing insignia. These identification markings were adopted by the Chinese Commission on Aernautical Affairs in 1932.

This Fairey single seater bears the markings of the Belgian Air Force

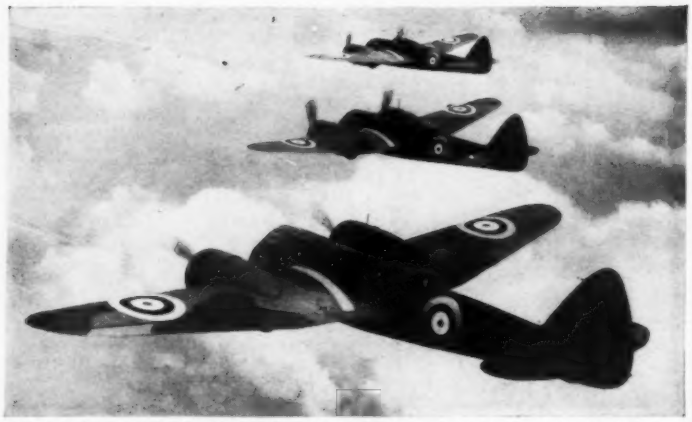
Russia

The Red Star which is used to identify Soviet military aircraft is a part of the state seal of the U.S.S.R. It appears on the top and under surfaces of the wings, on both sides of the rudder and is sometimes found on both sides of the fuselage. The insigne has been widely used since 1921 but was introduced earlier. The star is about twenty-four inches in diameter.

The Forces of Franco used a large "X" on the under side of the lower wings as shown on this Curtiss type biplane

Curtiss Hawk with blue and white insignia of China on the under side of lower wing

A German B.F.W. pursuit with white bordered black crosses and a swastika on the rudder



All "shadow shaded" planes like these Blenheim bombers of the R.A.F. bear the regulation tri-color cockade within a yellow circle

Finland

For centuries the Swastika was used as an ornament on various things such as handicrafts, pottery, etc., in Europe, Asia, Africa and, in America, by the Indians. It was regarded as a holy sign which brought good luck. Among the Lapps it was a symbol of the sun.

On Finnish military aircraft the Swastika sign was used for the first time in 1918, on the first airplane which was donated by Baron von Rosen of Sweden. Since then it has been used on all Finnish aircraft in memory of the Baron.

The colors blue and white have always been used in various ways in Finland. For example, the Finnish flag has a blue cross on a white background. One can find many different explanations of the origin of these colors. Finland, called the land of thousand lakes, regards blue as the symbol of its blue lakes and white symbolic of the snow.

Norway

The Norwegian aircraft insignia were first used by the army in 1913. Colors for the insignia were taken from the national flag which was adopted in 1814 after the dissolution of the union between Norway and Denmark. In choosing a new flag for Norway, the Parliament decided to use the Danish flag with a blue cross signifying their liberty. The Danish flag was then, as now, a red flag with a white cross.

Early this year Norwegian Army and Navy aircraft participated in combat against the invading German. The insignia design is the same for both army and navy aircraft.

Belgium

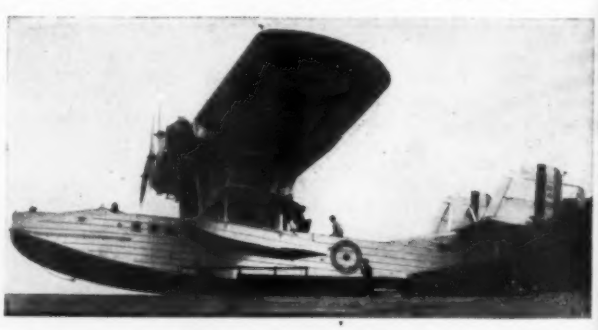
The valiant little Belgian air force was completely demolished at dawn on May 10th, 1940, when waves of German aircraft suddenly appeared over each airfield bombing and setting afire aircraft, hangars, and wrecking runways. The "blitzkrieg" lasted four hours and the Belgian air service ceased to exist. The tri-colored cocade and rudder marking colors were from the national flag.

France

The traitorous sell-out of France left a bewildered air force in abject humiliation. At the last moment, loyal airmen escaped to Africa with their machines where they were united into the first all French air unit with the R.A.F. The insignia, for many years recognized as the symbol of the valiant aerial fighting arm that brought forth heroes such as Fonck, Guynemer, Nungesser, etc., of the first World War, ceased to exist. The markings of the remaining French Air Force is still the original tri-color cockade first used at the outbreak of the Great War of 1914. The rudder stripes followed the order of the colors of the French tri-color, blue, white and red, blue nearest the fin.

(Continued on page 47)

A British Saunders-Roe flying boat with tri-color cockades and red, white and blue stripes on rudder (red nearest fin)

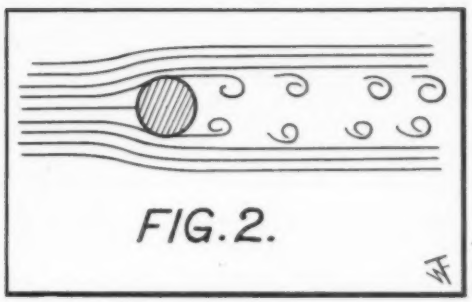


A camouflaged Douglas 8-A with Netherland's markings

Shore based planes of the U.S. Navy like this Bell "Airabonita" carry vertical rudder stripes

A Seversky pursuit built for Sweden with the Swedish emblem on the wings and fuselage. The ship has a natural finish

CUTTING DOWN THE DRAG



How Irregularities in Streamline Shape and External Parts Increase the Drag of Your Model in Flight

PART 2

By W. H. PHILLIPS and BILL TYLER

BY FAR the most important source of drag on any type of aircraft, whether it be a midget gas model or a passenger-carrying transport, is the unavoidable group of items which project into the airstream and break up the underlying "clean" lines of the streamlined surfaces. This group includes structural details like rivet heads, wing spars which cause a bump in the covering and many other small disturbing objects which, fortunately, can be much more easily avoided by the model builder than by the real plane designer. Then there are the necessary accessories which every model embodies. These include the cylinder head or cowling, the landing gear, and on some models dummy windshields, wing struts, exposed timers and so forth. Finally there is the propeller, which, though a very useful piece of equipment while the model is climbing, is a most unwelcome source of drag during the glide.

Though it is obvious that these objects all increase the drag of a model, it is nevertheless impossible to determine just how much they will spoil its performance, except by actual test in a wind tunnel. We can estimate fairly well how a square fuselage will compare with one of round cross-section from the standpoint of drag, but there is no theory which will throw any light on the subject of the drag of a cylinder head or the effect of a cowling. This article, for the first time, presents the result of actual wind tunnel experiments on this problem. The tests were made in the four-foot tunnel of the Massachusetts Institute of Technology aeronautical laboratory. They were carried out on full scale gas models and at wind speeds corresponding to those of actual gas model flight. The great precision of the balances with which this tunnel is equipped insures the accuracy of the results.

As was pointed out in the first article in this series, what we really mean when we speak of the drag of an object is that air is being "dragged along" with the body when it moves. This concept is particularly useful in understanding the results of this series of tests, for one can readily see how protuberances such as a cylinder head or landing gear strut can "hang on" to some air and pull it along in their wakes. Only by this mechanism can we imagine the explanation of the remarkable situation shown in figure (1); a seemingly insignificant group of landing gear struts giving more drag than a full-sized fuselage. And if this situation still appears amazing, let us warn you that it is but the first surprise of a number which will appear in the following paragraphs.

The drag of an apparently small object may be much greater than expected for two reasons. The first is that a round or otherwise unstreamlined strut can generate a wake much wider than the strut itself. This situation, which is illustrated in figure (2), occurs especially when the strut is small; or, more precisely, as the aerodynamic experts would say, when it is operating at low Reynolds numbers. This is the case when we are considering, for example, a landing gear strut of 1/8" diameter music wire and the drag of such an item would be expected to be very large.

The second reason is that an obstacle to the flow near the nose of a streamlined fuselage may cause turbulence in the air all along the side of the fuselage from the nose to the tail. The result of this disturbed airflow in the layer of air near the fuselage replacing the smooth streamlines which would otherwise occur is a large increase in the fuselage drag. A typical example of this unfortunate occurrence is the use of an elastic band wrapped around the fuselage to hold the

(Continued on page 52)

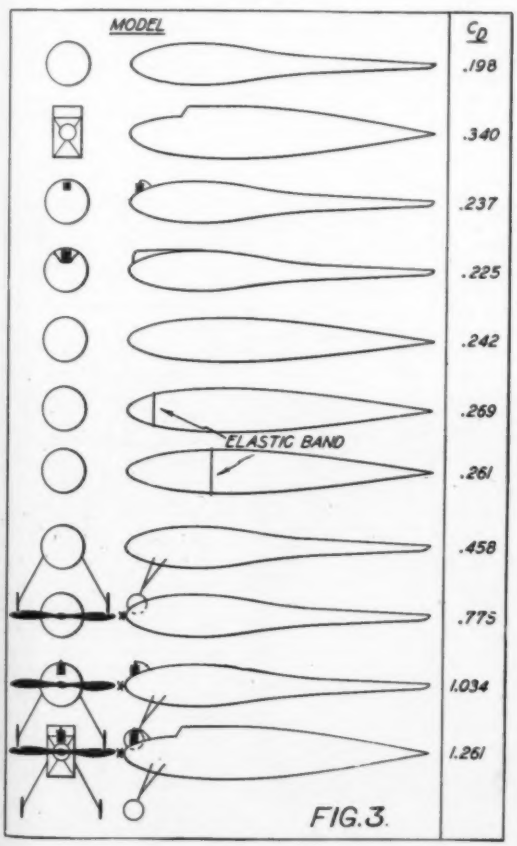


FIG. 3.

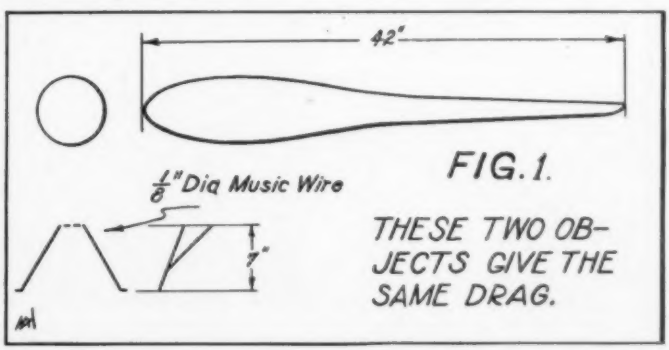
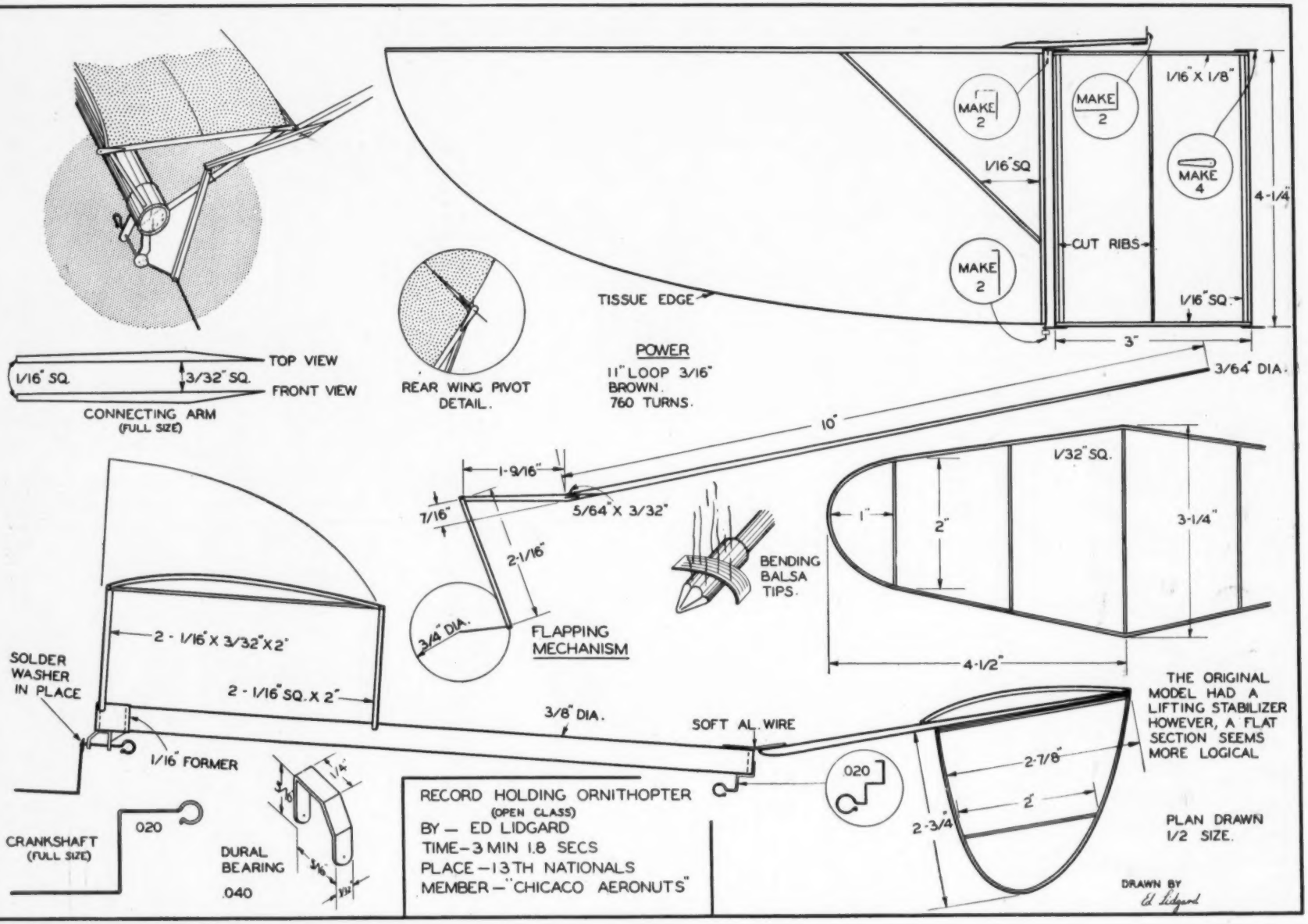


FIG. 1.

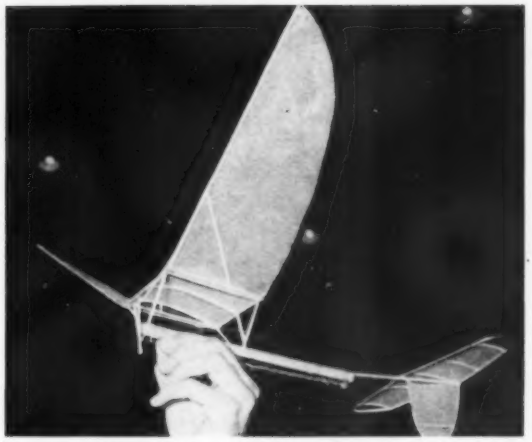
THESE TWO OBJECTS GIVE THE SAME DRAG.


1/16" SQ.
3/32" SQ.
TOP VIEW
FRONT VIEW
CONNECTING ARM
(FULL SIZE)
REAR WING PIVOT
DETAIL.
TISSUE EDGE
MAKE 2
MAKE 2
MAKE 4
MAKE 2
1/16" X 1/8"
1/16" SQ
CUT RIBS
1/16" SQ.
4-1/4"
3"
POWER
11" LOOP 3/16"
BROWN.
760 TURNS.
3/64" DIA.
10"
1-9/16"
7/16"
5/64" X 3/32"
2-1/16"
3/4" DIA.
FLAPPING
MECHANISM
BENDING
BALSA
TIPS.
1/32" SQ.
1"
2"
3-1/4"
4-1/2"
2 - 1/16" X 3/32" X 2"
2 - 1/16" SQ. X 2"
SOLDER
WASHER
IN PLACE
1/16" FORMER
3/8" DIA.
SOFT AL. WIRE
.020
2-7/8"
2"
2-3/4"
THE ORIGINAL
MODEL HAD A
LIFTING STABILIZER
HOWEVER, A FLAT
SECTION SEEMS
MORE LOGICAL
PLAN DRAWN
1/2 SIZE.
CRANKSHAFT
(FULL SIZE)
.020
DURAL
BEARING
.040
1/4"
3/16"
3/16"
RECORD HOLDING ORNITHOPTER
(OPEN CLASS)
BY — ED LIDGARD
TIME — 3 MIN 1.8 SECS
PLACE — 13TH NATIONALS
MEMBER — "CHICACO AERONUTS"
DRAWN BY
Ed Lidgard

THE WORLD RECORD FLAPPER

A Champion Ornithopter That Has Remained In Flight Longer Than Any Other Flapping Wing Machine—How You Can Build It

By ED LIDGARD



The little ship that flapped its way to a world record of 3 min. 1.8 sec.

BIRDS have fired the imagination of many men but their easy majestic flight has never been imitated fully. Leonardo da Vinci left among his scientific writings sketches of mechanisms intended to fly like the birds. A Frenchman Alfonse Penaud in 1860 experimented with ornithopters and built a model which flew for 20 seconds, though he finally gave them up when he reached the conclusion that such a type of aircraft could never be successful beyond the model stage. Since his time others have done further experimentation but few with notable results.

Late in 1936 a few of the members of the Chicago Aeronuts club built a model from plans in MODEL AIRPLANE NEWS. Continued experiments were made and quite a few members built model after model until in February 1937 we held a sanctioned contest for Ornithopters. The records established are as follows:

Junior—Milton Huguelet, 1 minute 36.8 seconds.

Senior—Dennis Turner, 2 minutes 21.6 seconds.

Open—Carl Goldberg, 1 minute 28 seconds.

A few months later Dennis Turner made a time of 4 minutes 19.2 seconds, which is the longest flight ever made by an ornithopter. The model presented here is very similar to Dennis' model.

Now, with your kind indulgence, we would like to bring a point to your attention: We believe the ornithopter would still be a "lame pigeon" if it were not for the spirit of the Chicago Aeronuts club. During the year or so in which we specialized in ornithopters only two models were built which were identical; each member built and progressed on the findings of the others, adding to the general trends and discarding those features found undesirable. Our weekly discussions invariably sent everyone home with new ideas ready to bubble out in balsa wood. It is this rugged (or ragged, as some say) individualism which brought certain fine points of design to light which no one or two individuals could have unearthed in a life time. Therefore, in presenting this model to you, we present only our version of the Chicago Aeronuts findings.

We personally have found ornithopters to be the easiest to build and fly of all types of models, and yet be the most abundant in possibilities for advanced research and design. Many of us believe that 6 to 8 minutes are no more fantastic than 20 minutes with an indoor "C" tractor.

Those of you who have not seen a "flapper" fly are in for a thrill. They make a snapping sound similar to a pigeon climbing vertically with its wing tips touching on the up stroke. No matter what the angle of attack an ornithopter will not stall; they may be launched in any attitude (unless wound to capacity) and immediately roll into a normal flight attitude.

Well let's start the construction, but before you do bear in mind this axiom "You must spend time on a model if you expect it to do time for you." A few moments spent in making a model correct and smooth-working will save hours of testing and pondering over queer flight antics. True, you can build a model any old way you may please, but a good model takes a little care and usually a builder is well paid for his great care.

The author adjusts the plane for a record flight

Wing

This is the simplest wing in the world to build, yet it must be done carefully. The main spars are 5/64" x 3/32" tapering to 3/64" in diameter. These spars should be absolutely identical in flexibility and strength so that the wings will flap in absolute unison without vibration. The connecting arms from the spars to the connecting rods should be just long enough to clear each other by 1/16" while flapping. If this is not done one wing will always be just a trifle ahead of the other in the flapping cycle.

If you intend to experiment with the design be certain that any changes you should make will tend to keep both panels flapping in unison instead of being in different phases of the cycle. The remaining pieces are cut from 1/16" square and are glued to the spars over a full size pattern. The superfine covering is then cut to shape with the grain of the paper running perpendicular to the chord. This is necessary in order that the paper will flap efficiently. Ordinary banana oil is used as an adhesive, but do not dope the covering of the wings as it is not necessary. A note upon superfine tissue: The best grade of superfine tissue is light creme in color and gives off a crinkling sound when shaken. It is this peculiarity of the paper that results in a snapping noise as the wings flap.

The necessary wire parts are bent from No. 010 music wire and are carefully cemented in place.

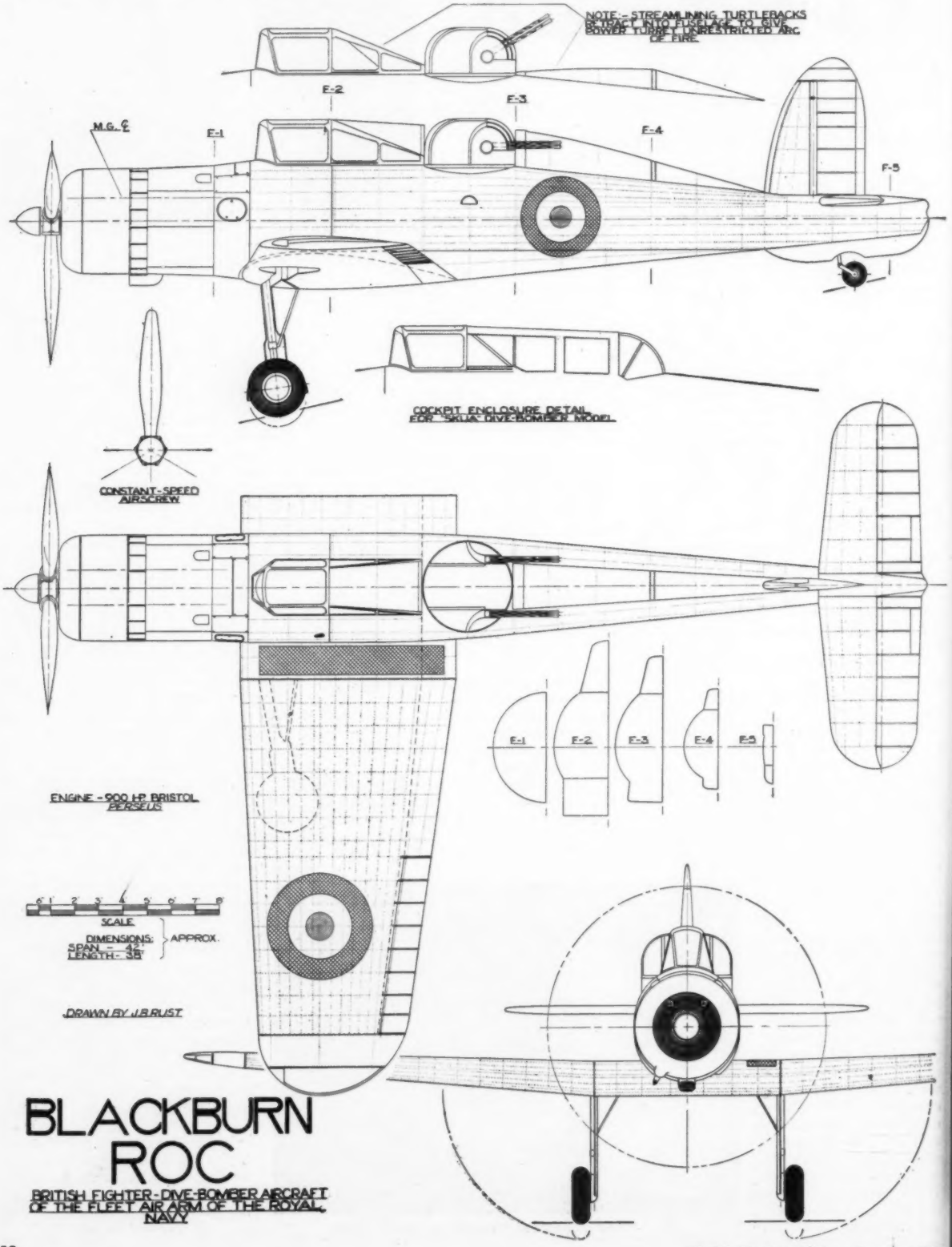
Motor Stick And Boom

Select a 1/32" sheet of quarter-grained wood 1" x 10" of constant quality. Sand it smooth with very fine sandpaper and soak in warm water to make it more flexible. With firm, but even pressure bend it around a 3/8" rod. Bind evenly but firmly with 1/2" gauze and set away to dry thoroughly while working upon another part. Allow a day at room temperature for thorough drying, or a few hours in a warm oven. Cement the seam. Care must be taken that excessive glue will not warp the tube from its circular

(Continued on page 39)

THE BRITISH BLACKBURN FIGHTER-DIVE BOMBER

This plane, a two-seat fighter and dive-bomber, is one of Britain's latest additions to its fleet air-arm. It is similar in design to the "Defiant," so deadly to the enemy: embodying the power-driven four-gun turret to the rear of the pilot. One of the features is the retractable turtle backs, streamlining the gun turret. Retracted, they allow a wide arc of fire.



Sinbad's Modern Mount

By ROBERT McLARREN

The Blackburn Roc with deadly 4-gun power-driven turret

THE PLANE ON THE COVER

CERTAINLY no story of Aladdin's magic lamp nor a tale from the Arabian Nights is this modern World War II. But the Roc it was that carried Sinbad the Sailor aloft and the Roc it is today that is carrying nervy Fleet Air Arm sky-warriors aloft to do battle with the Hordes of Hitler. Contrary to popular opinion, Great Britain does not have the completely unified Air Force many claim her to have. In 1937 all ship-borne aircraft of the Royal Air Force were placed under the command of the Admiralty and this new (or rather old—insofar as it was a re-establishment of the Royal Naval Air Service consolidated with the Royal Flying Corps in April, 1918 to form the present Royal Air Force) air branch of the R.A.F. was given the official divisional classification of Fleet Air Arm.

Today it functions not completely unlike our naval aviation, for specific aircraft are designed for it, its duties are of a naval character and its officers are answerable only to the Admiralty through the Naval Air Division. Its officers are Royal Air Force men, however, having been trained by the R.A.F. at its stations in its equipment and the officers wear the uniform of that branch.

Although Blackburn aircraft have been supplied to the Fleet Air Arm since its earliest days, the famed "Skua" was a handsome "first" in many respects. It is the first monoplane to be used by the Royal Navy and the first two-seat fighter dive-bomber ever designed and built for it. The Skua was built in large numbers and Squadron A-7 aboard the aircraft carrier "H.M.S. Ark Royal" gained an enviable reputation before the tragedy involving the 22,000 ton sea-going airport. Since the end of the Hitler Blitzkrieg, the British Fleet has been comparatively inactive and the Skuas have been shore-based operating from Lee-on-Solent, Worthy Downs and Donibristle Naval Air Stations.

Many lessons were learned in the first year of the war particularly applicable to aircraft armament, and after the escape from Dunkirk in which the potent Boulton & Paul "Defiant" (MODEL AIRPLANE NEWS, April, 1940 issue) made such effective use of its power-driven turret, a re-design and re-arming of several outstanding British

(Continued on page 68)

Stop! Look!—And Learn A Lesson

Says THE INSTRUCTOR

KEEP an eye on that gas entrant as he readies his ship for an official flight. After flooding the engine several times he has it running reasonably smooth, then looks around to see if the timer is on the job and finally gets the model off with a decided push which puts the ship into a steep left bank.

Nature takes no excuses

The poorly-adjusted motor strains to pull the craft out of a tight bank, as the model starts upstairs in a series of dips and climbs remindful of a duck waddling.

About twenty seconds of this, and, alas, the motor cuts and the arc of these dives increases as the stalling tendencies dictate the path of flight. As happens in all too many cases, the model hits on the far side of the field during one of its dipsy-doodle dips and result is one bent crankshaft, a three-piece prop and a plane which has returned to its pre-construction stage of a few pieces of balsa and bits of tissue.

Now, note the dejected approach of the flyer as he reaches the wreckage along with a scavenging-minded throng.

First his attention is directed to the model—no use, completely washed out. Then the motor—well, a couple of bucks to have that fixed up. At least the batteries, wheels and timer can be salvaged. "Sure, sure—you can have the plane. It's no good to me now," says our modeler to a spectator.

What's wrong with this performance, folks? We know that the model wasn't test-glided and that the wings were bound to the fuselage too tightly. But the fault we see, and one made by all too many flyers, is that not enough attention to details was shown by the modeler.

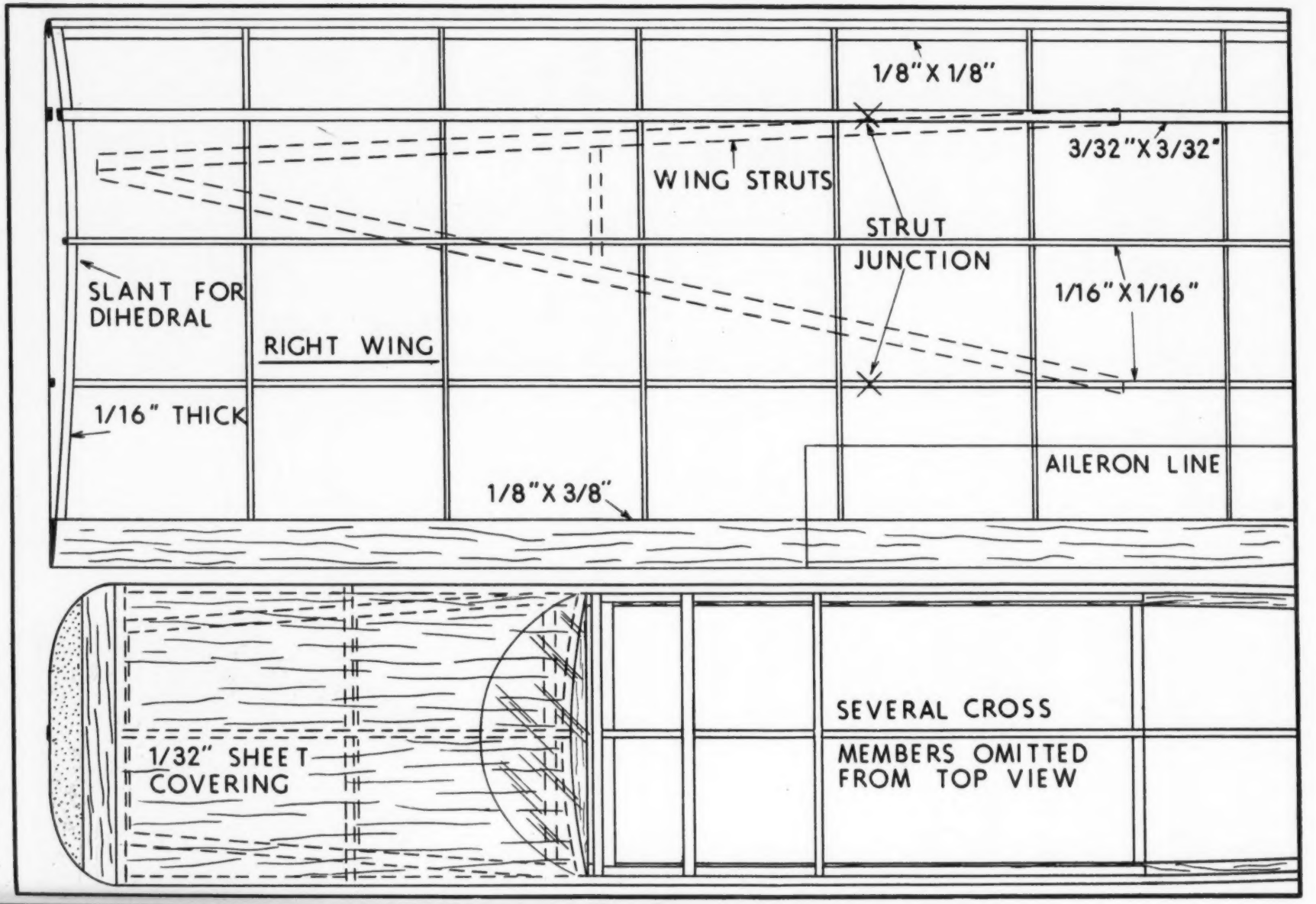
Take full-scale aviation. What happens when a crash occurs? Investigations! Why not the same procedure for model aviation?

Did our object-modeler look over the debris of his ship to see what gave, what held? What parts survived the crack-up; was any faulty construction shown up when the model was subjected to this shattering crash?

Much can be learned from such detailed study! Not that our contention is every model flyer should be an aero-modeling Sherlock Holmes. No, just display a little more "hoss sense," please.

For instance, what record do you have of all the models you've built and flown? Which ones performed the best? Which ones lasted the longest? No need to take a bookkeeping course in order to compile a little data on your modeling efforts. Use any old notebook to jot down the characteristics of each model you complete. Data such as: Original or kit design? Airfoil? Wing Area? Wing shape? Covered with? Incidence? Stab size? Setting? Percent of wing area? Type of rudder used? What kind of fuselage? Covered with? Finished with? What motor did you use? Color of model? Flight performance? Completed when?

(Continued on page 46)


1/8" X 1/8"
3/32" X 3/32"
WING STRUTS
STRUT JUNCTION
SLANT FOR DIHEDRAL
RIGHT WING
1/16" X 1/16"
1/16" THICK
AILERON LINE
1/8" X 3/8"
1/32" SHEET COVERING
SEVERAL CROSS
MEMBERS OMITTED FROM TOP VIEW

Exactly to scale with only added dihedral

A long nose gives balance without added weight

A Miniature Flying "Cadet"

A Realistic Flying Scale Model With Proportions That Give It Contest Performance

BY EARL STAHL

UNCLE SAM has recognized that one of the greatest assets to the aerial defense of our nation is to have a vast store of trained flyers. The Civilian Pilots Training Program, while of a non-military nature, is expected to supply, at a comparatively low cost, thousands of potential military aviators: 100,000 of whom are said to be required to man the great number of fighting craft now under construction.

Interstate's new lightplane, the "Cadet," was designed specifically for the requirements of training planes for this program. This two-passenger sport-trainer follows conventional lightplane practice and incorporates features of design and construction to improve performance and facilitate manufacture and maintenance. Powered by a four-cylinder Continental engine of 65 h.p., it zips along at a maximum speed of 109 m.p.h. A non-stop flight of 375 miles is possible while averaging 100 m.p.h. When it is necessary to land the "Cadet" floats to the runway at a mere 36 m.p.h.

Aerodynamically and structurally, the Cadet is ideal for modeling. Unlike most lightplanes, it has a rather long fuselage as compared to the wing; the nose is long enough to create proper balance. Further, a large propeller can be used without lengthening the landing gear. Because of the plane's simple yet attractive design, it is not difficult to construct an accurate, rugged model with a superior flight performance from the plans which accompany this article.

It's just like a large ship in flight

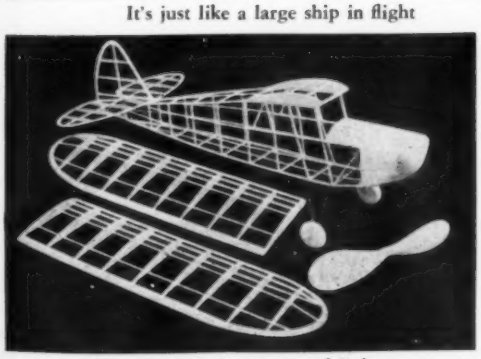
Following is the recommended procedure of construction:

Fuselage

Properly join the plans together so construction can be started. A rectangular frame is the backbone of the fuselage; it is shown lightly shaded on the plan. Two sides are built from medium-grade 3/32" square balsa, one atop the other to insure identity. When the cement has dried, the two sides are inverted over the top view; pin them into position and cement the 3/32" square crosspieces to place, being careful the entire structure is correctly aligned. It will be necessary to crack the longerons in order that they can be pulled into position at the front. Cut the formers of sections A-A, B-B and former No. F-3 from 1/16" sheet, and now, if the basic structure is dry, it should be removed from the work board and the formers should be attached to their correct places. The wing center section is constructed directly atop the fuselage; make this very accurate since the wing's correct placement is determined by its position. Since the stringers are merely fairing strips, they should be of soft balsa. As shown by a view of a typical fuselage cross-section, the stringers are cemented directly to the underframe, except where there are formers, of course.

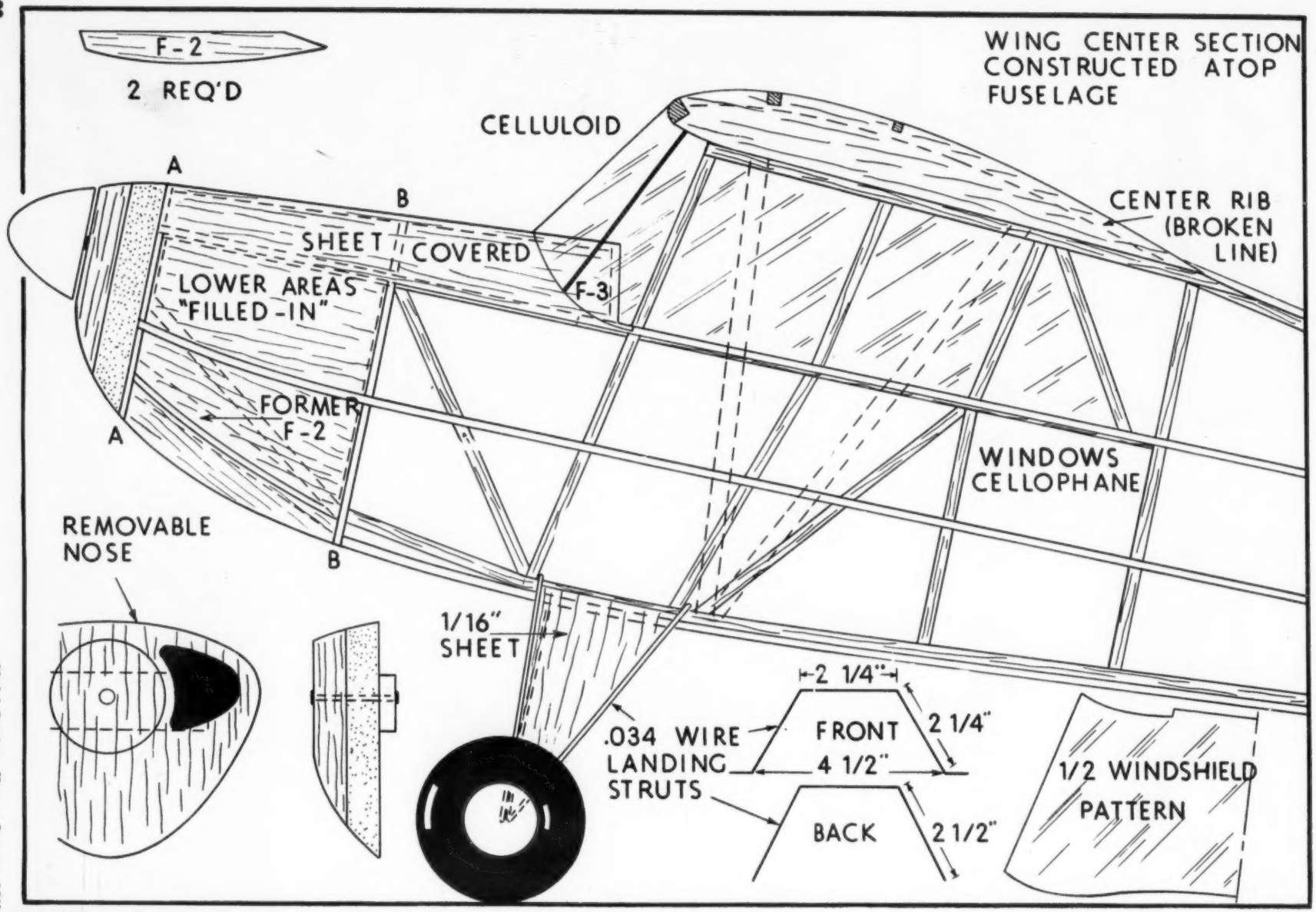
To effectively represent the metal engine cowling of the real ship, a portion of the nose is covered with thin balsa sheet and the remaining portion is "filled-in" with scraps of soft balsa. The section above the main longerons can be covered with 1/32"

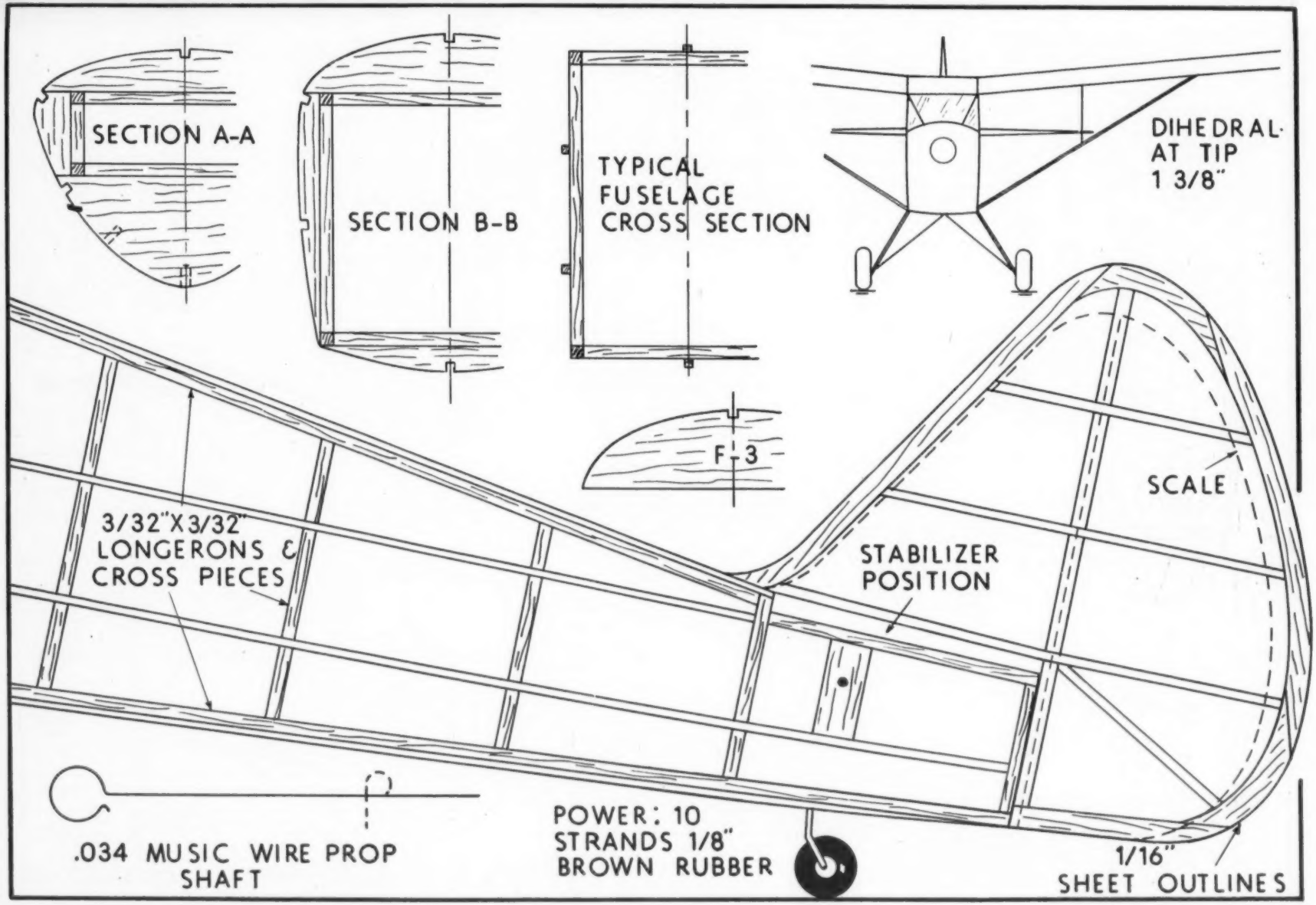
(Continued on page 44)

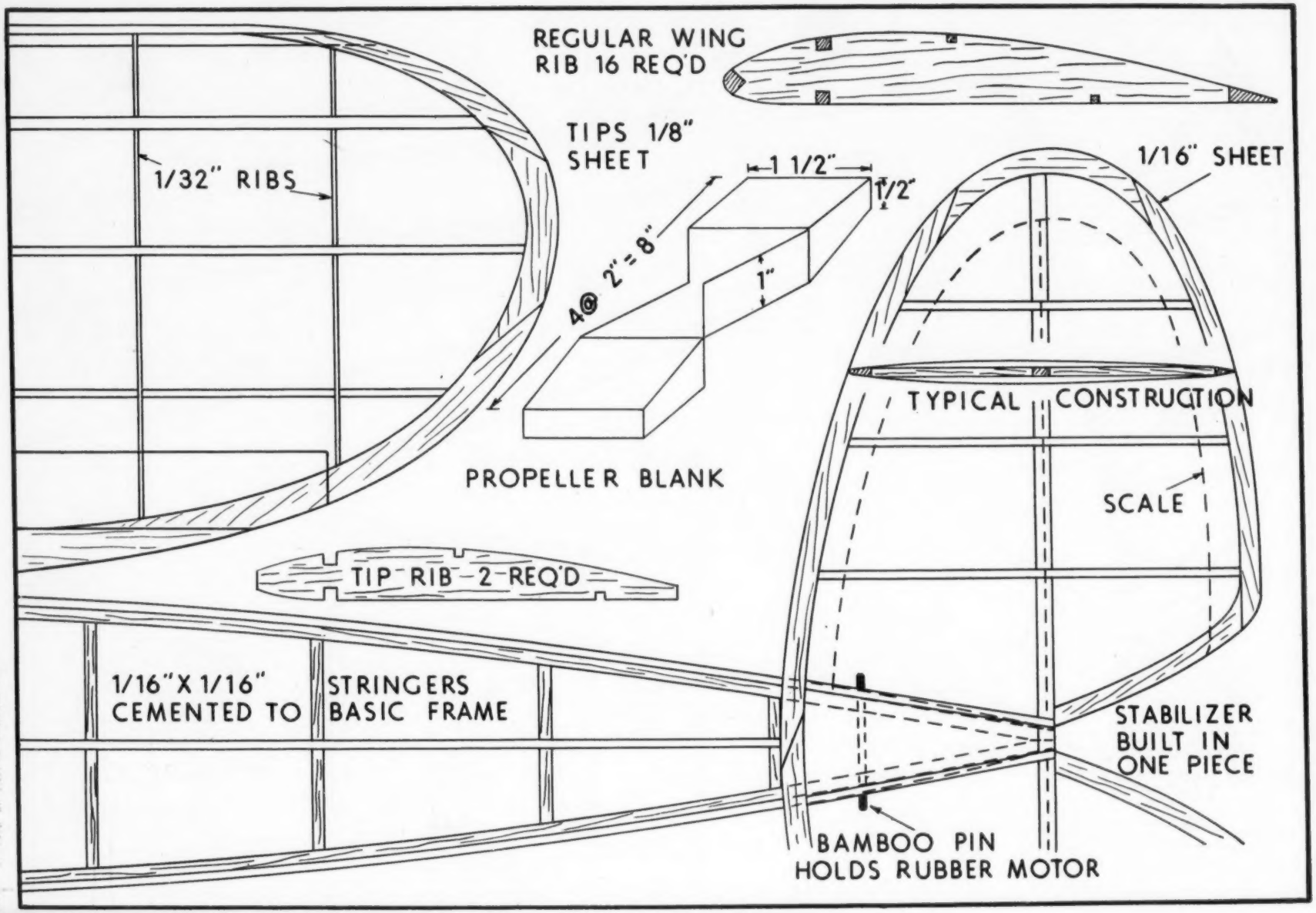


The structure is strong and light

Stability from high wing; efficiency from large prop

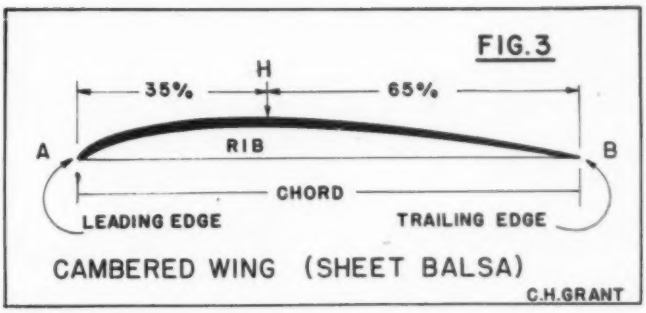

F-2
2 REQ'D
WING CENTER SECTION CONSTRUCTED ATOP FUSELAGE
CELLULOID
A
B
SHEET COVERED
LOWER AREAS "FILLED-IN"
F-3
CENTER RIB (BROKEN LINE)
FORMER F-2
A
B
WINDOWS CELLOPHANE
REMOVABLE NOSE
1/16" SHEET
2 1/4"
.034 WIRE LANDING STRUTS
FRONT
2 1/4"
4 1/2"
BACK
2 1/2"
1/2 WINDSHIELD PATTERN


SECTION A-A
SECTION B-B
TYPICAL FUSELAGE CROSS SECTION
DIHEDRAL AT TIP 1 3/8"
F-3
SCALE
3/32"X3/32" LONGERONS & CROSS PIECES
STABILIZER POSITION
.034 MUSIC WIRE PROP SHAFT
POWER: 10 STRANDS 1/8" BROWN RUBBER
1/16" SHEET OUTLINES


REGULAR WING
RIB 16 REQ'D
TIPS 1/8"
SHEET
1/32" RIBS
1 1/2"
1/2"
4@ 2"=8"
1"
PROPELLER BLANK
1/16" SHEET
TYPICAL CONSTRUCTION
SCALE
TIP RIB 2 REQ'D
1/16"X 1/16"
CEMENTED TO
STRINGERS
BASIC FRAME
STABILIZER
BUILT IN
ONE PIECE
BAMBOO PIN
HOLDS RUBBER MOTOR

MODEL DESIGNING SIMPLIFIED

By CHARLES HAMPSON GRANT



How to Build Your First Power Plane—Determining Correct Proportions for Simple Flight by Simple Rules

Article 2

THE greatest problem that confronts beginners in designing a model plane is to make it stable. Usually they follow a course of making their model *look* like an airplane. Thus the structure is like a plane but almost always the *balance* and proportions are incorrect for stable flight. In other words, the secret of making a model stable is to make it with the proper proportions and balance. If properly proportioned it also will be fairly efficient. If the various units such as the wings, tail planes, propeller and exposed structural parts, are properly *shaped*, the plane will be very *efficient*.

The preceding article, No. 1, gave the correct proportions for a simple, stable glider. Basically, a power-driven model embodies the same essential factors and should have the same proportions; the only difference being that the latter is equipped with a *propeller* to pull the plane through the air instead of depending upon *gravity* to perform this function. As the name implies, a glider glides or "coasts" down-hill under the pull of gravity, like a car or bicycle. When power, delivered by rubber bands or a motor, is applied to turn a propeller, the latter generates a pull or thrust which is used to draw the model forward, causing the wings to lift as they pass through the air.

This unit is added to those included in the glider described in article No. 1, to create your power-drive plane. Then the factors or units essential for flight, which the structure of the plane should include, are as follows:

1. The wings to provide lift; 2. The tail planes to insure stability; 3. The propeller to generate the thrust which drives the plane forward; 4. A landing gear to enable the plane to take off and land; 5. A framework which holds all of these required units in their proper position relative to one another.

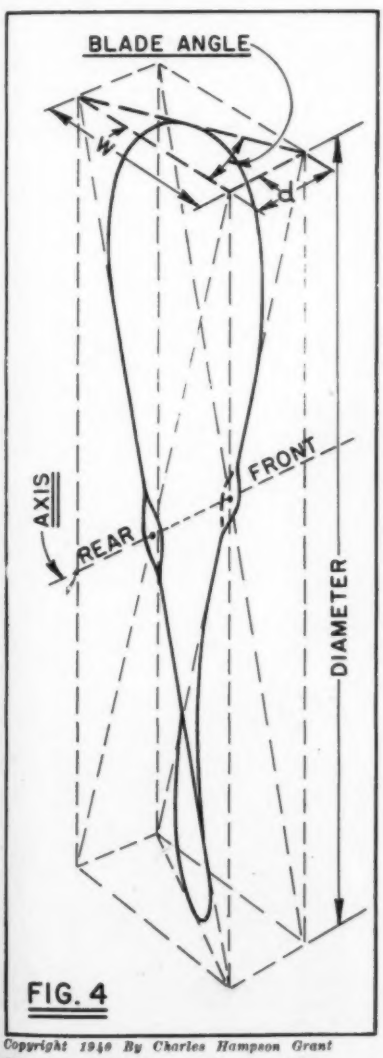
These can be put together to form many types of airplanes, but the one to be designed here should fulfill the purpose of a plane easy to build and easy to fly: It should fly consistently without the necessity of careful adjustment or manipulation by an expert. It should serve the purpose of affording its designer flight training and pleasure; enabling him to learn the basic principles of designing, building and flying a model.

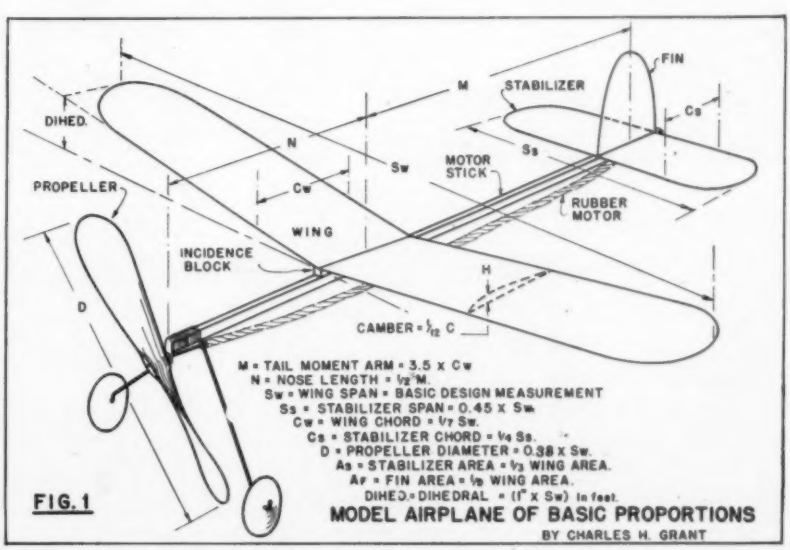
The stick type is the simplest form of model. One of the size and proportions of the stick glider (in article No. 1) is very suitable. Therefore the glider design may be taken as a starting point. All that is required is to add a propeller to the glider in a proper manner.

An outline of the proportions and measurements, following the glider as a basis, is as follows:

Wing Span=21 inches; wing chord= 1/7 wing span=3 in.; tail moment arm

(Continued on page 58)





Copyright 1940 By Charles Hampson Grant

GAS LINES

AIR WAYS

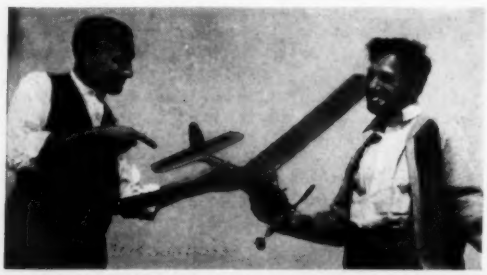
NEWS OF MODELS AND BUILDERS FROM ALL PARTS OF THE WORLD

Pict. 1. (Left) R. R. Anderson's gas-powered scale Hawk

THE Academy of Model Aeronautics has succeeded in tying together all modelers with strong but intangible bonds. The function which it performs is essential to the welfare of the whole sport; without it each modeler would be a little unit, working by himself, without the cooperation of others and an interchange of ideas necessary for the intellectual growth of all those in this field.

Contests serve to get all together in a social sense as well as merely to provide means for flying planes in competition. The value of this may not be noticeable but it is very real.

Apparently there is only one thing lacking, which this magazine wishes to bring to the attention of all modelers and the A.M.A. As a leader in the field, it proposes a very necessary and definite step at this time. This step is to provide a means for model builders in all communities to have a common meeting place, in each community, wherein their model plane activities may be carried on without hindrance. In other words, we advocate the establishment of model airports in every community of the country.



Pict. 4. Joe Mastrovitch gives Louis Garami a square-end wing to try on his plane. Joe expounds its virtues — but Louis is skeptical

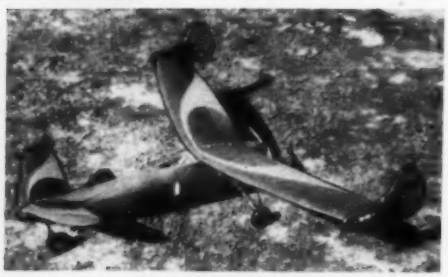
Pict. 5. A new type "tailless" with no sweep-back

A little thought will immediately bring out the value of such a scheme. First of all, Jim Jones and Tom Smith will have a place to fly their planes; where they can get together, talk over matters and gain benefits from each other's experiences; each will not have to go to some different locality, convenient to each individual. A model airport would provide flying facilities. A small field-house at the airport would serve as a place to keep all necessary flying equipment; such as, run-ways, stop-watches, records and flight cards, etc.

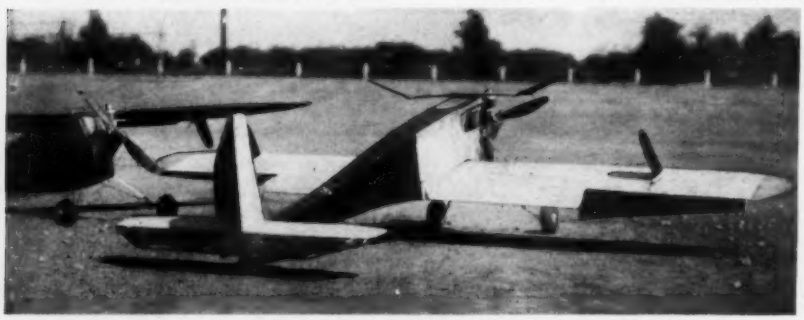
Such an airport would advance model plane flying to a far greater degree than possible at the present time; not only youngsters would know where to go to see models fly, but adults as well.

There are few communities in which there is not a convenient place in which a model airport could be established; and civic groups of various communities, if properly approached, should be only too willing to cooperate in the establishment of such a feature and in its management. It is suggested that the promotion, establishment and management of the airports be put into the hands of senior NAA members of the various localities throughout the country. This will enable the senior membership to become more air-minded and to also serve the youth of the country in an aeronautical capacity. In this way "two birds

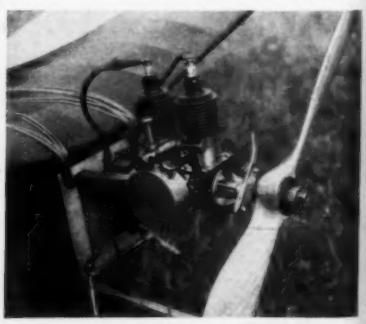
Pict. 6. Yes—it's a model of 18 ft. span



Pict. 7. A successful "canard gas pusher"

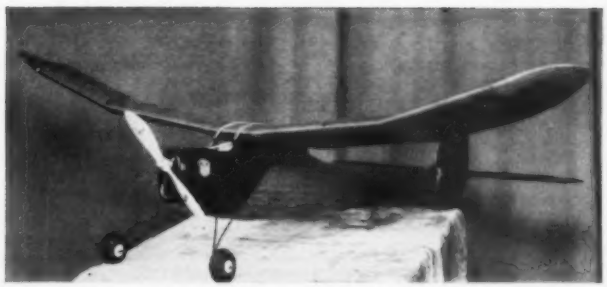


Pict. 8. Planes equipped with C. H. Vance's automatic control device



Pict. 9. Neal Kohler's "Twin"

Pict. 2. Tom Fox spins the prop of his gas job. Maurice Zubatkin's trick photography shrank him to proper size



Pict. 3. Jack Moralez Nebraska-S.E. Iowa 1940 champion gas model. It climbs 550 feet in twenty seconds; a beautiful job

are killed with one stone"; namely promoting aviation and, two, the welfare of young people. The latter has been a distinct problem in every community. The desire has been in the hearts of many but the means hasn't been apparent.

Junior model leaders in the various sections would carry on all activities at the airport. It wouldn't be their function to promote or manage the airport except in an advisory capacity.

The possibilities of what such a program would develop into staggers the imagination; each airport would become a center of education for both youth and adult.

We therefore suggest that the Academy of Model Aeronautics undertake such a program; taking steps to establish a nation-wide system of model flying fields. We request all those who think this would be an excellent idea and are in favor of it to write to Mr. Albert L. Lewis, Academy of Model Aeronautics, Willard Hotel, Washington, D. C.

Activities in the gas field are growing with leaps and bounds and with each succeeding month it becomes more difficult to give you all the news. Nevertheless, here are a few interesting features:

Picture No. 1 shows a gas scale model Hawk, built by R. R. Anderson of South Portland, Maine, P. O. Box 2143. It is powered with an Ohlsson "23" and has a span of 40 inches; weighing 2 lbs. Anderson says: "Considerable more detail has been put into the job than is necessary for a good flying model. Some of this includes carved pilot electric lights, gun sights, screen radiator, hinged hatches, etc. Little weight was added in duplicating these details, however. The belly tank, which is removable, encloses the timer. The only deviation from exact scale is the increase in the dihedral angle, which is not very apparent. The model is very realistic, covered with silk with blue, doped fuselage and yellow wings. The little ship flies beauti-

Pict. 15. Murray Ellis "Tunes up" in Minnesota

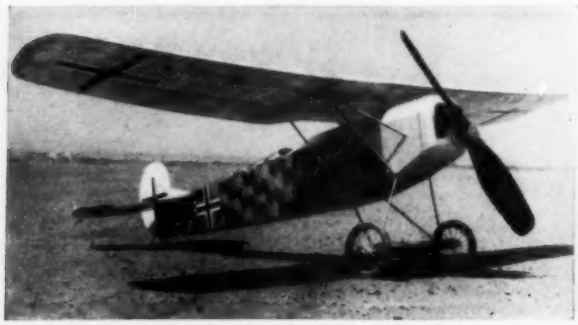
Pict. 13. Barney Snyder builds a plane from a cardboard carton—Yes, Mr. Ripley!!

Pict. 14. Garami's gas job takes off like a helicopter without run

Pict. 12. All these people are interested in models; at the California Championships

Pict. 10. Joe Konefes "tunes up" for his winning flight

Pict. 11. Officers and Council of Holyoke Gas Model Club



Pict. 16. Looks real, but it's only a scale Fokker D-8

Pict. 17. Joel Isenberg's champion model starts to go places

Pict. 21. Bobby Bates, age 10, is West Virginia Junior Class D, R.O.W. Champion

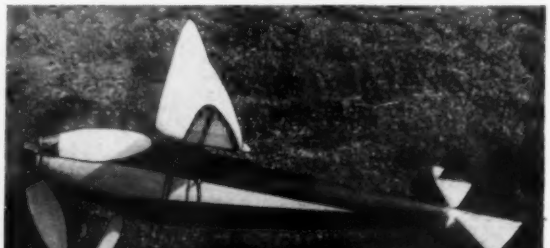
fully in spite of the many added details."

The trick photographers are at it again! Picture No. 2, if we are to believe what we see, shows a miniature model builder spinning the prop of a gas job; or is it a full-size man and plane? The ship belongs to Tom Fox of Hoboken, N. Y., who is seen spinning the prop. The picture was taken by Maurice Zubatkin of 623 River Road, Delawanna, N. J., who is a camera fan as well as a model flyer, which accounts for the trick photography. Zubatkin says that he spends a great deal of time at the Delawanna Airport which is very popular with the local model builders, many coming from as far as Jersey City and Newark. Many members of the Stratosphere Club of Passaic also are often on hand.

In picture No. 3 you see the model which holds the record for the Nebraska-S.E. Iowa Championship Trophy for 1940. It was designed and built by Jack Moralez of 1440 P Street, No. 6, Lincoln, Nebraska. Moralez says the ship has placed in every contest in which it has been entered and has doubled its cost in value and awards received. Powered with an inverted Ohlsson "60," it climbs about 550 ft. in 20 seconds. The best times are an unofficial flight of 17 minutes and an official one of 6 minutes 51.2 seconds out-of-sight. The cost of the materials was about $5, not including the motor. It has a span of 73 inches, chord of 12 inches, over-all length of 53 inches and weighs just 60 ounces. Taking off, the wheels leave the ground less than 5 ft. and it will jump a line 50 ft. high, 50 ft. from the take-off.

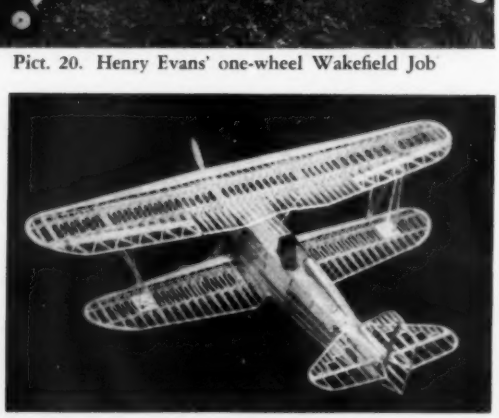
The ship is beautifully designed and from the general set-up should be stable under all flight conditions; i.e., in horizontal flight as well as climbing. The center of lift is high relative to the C.G., as is also the line

(Continued on page 61)



Pict. 20. Henry Evans' one-wheel Wakefield Job

Pict. 22. Edward Gumell is winning contests around Pittsburgh, Pa.



Pict. 23. A perfect scale Hawk P6-E built by Greg Loucks. Even each rib is built-up of small parts

Pict. 18. Allan Kitchel's collection of World War "scales"

Pict. 19. A group of contestants at the Detroit contest

The new Bell army YFM-1A five-place fighter recently delivered to the Materiel Division, Wright Field

FRONTIERS

Highlights of the Latest Developments in Aviation

By ROBERT C. MORRISON

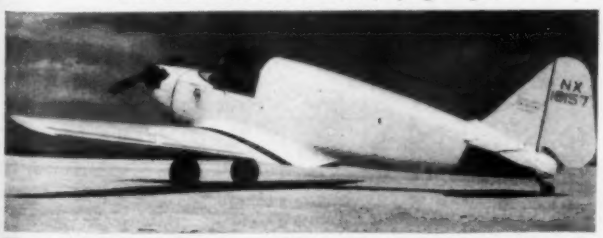
The Bristol "Beaufort" fighter bomber, powered with two 1050 hp. engines, this type is carrying the war to Germany

BOEING is going to build a patrol bomber for the U. S. Navy! When the army and navy let loose on the aircraft manufacturers with their seige of orders in numbers faster than you could count, the company executives joined the "Order of Grab" and welcomed the flowing millions of dollars with open arms. Nothing was too big for them. It is said that Curtiss-Wright has over $550,000,000 worth of orders on hand now, which is like feeding an already stuffed elephant a couple of carloads of peanuts. As the government went on that money-spending surge through the aircraft manufacturers bewilderment, surprise and confusion were the main order of things. Executives who had danced around their offices a couple of years ago on receiving orders of about 15 airplanes are now to be the busy little men that will produce them in the thousands. It is quite possible that press dispatches gave Lockheed more orders than the Air Corps did in looking over the reports on how the P-38 was ordered, re-ordered and ordered some more. However, it is reported that the interceptor-pursuit has now gone all the way up to the P-38E designation. Even the big four-engined jobs were ordered in lots of over 100. One can readily imagine what happened to the poor fellow who received a one-plane order. He was so far buried under the pile of news dispatches that he never did come up for air. It is these one-plane orders that are important though, because it means the development of a new design that will more than likely surpass anything else yet built. This is the case of the new Boeing patrol bomber. No details have been disclosed on the airplane, but Boeing, the big plane builder that it is, may give Glenn L. Martin stiff competition in the "flying battleship" category. It is known that Boeing has spent at least a year already in developing this new patrol bomber, and now that she has some good "clipper ship" experience under her hat the company should do right well with a flyingboat for the U. S. Naval Air Service. Truly an experimental airplane of entirely new design, it will give the "va-

(Continued on page 54)

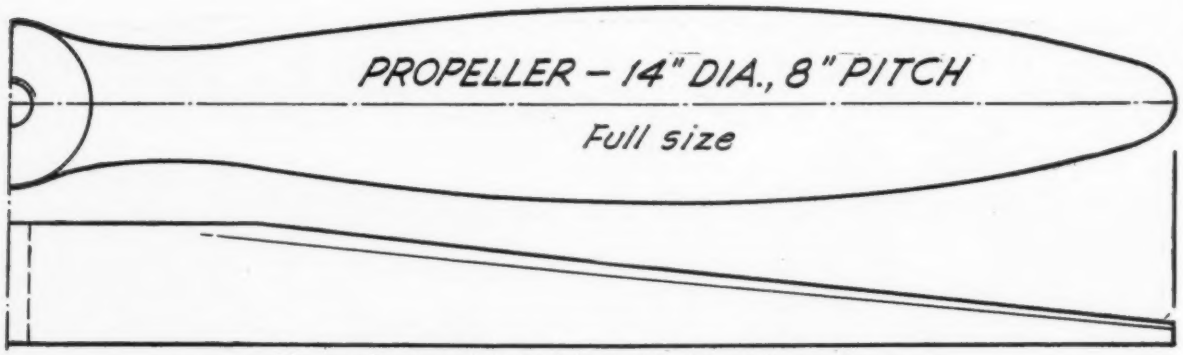
The British Miles "Master", world's fastest trainer and a two-seat fighter. It dives at 504 m.p.h.

Lockheed Hudsons of the RAF, flying on patrol over Heligoland



The 75 hp. Martin Jensen sportplane with monocoque fuselage, plywood-covered wings: Speed 115 m.p.h. (Kulick)

A 675 pound plane built of plastic-treated wood that makes 145 m.p.h. with 75 hp.



Plan and side views of the block from which the propeller can be cut

A True Pitch "Gas Prop"

A Practical Method of Creating Gas Model Propellers That Will Operate With Greatest Efficiency

By H. A. THOMAS

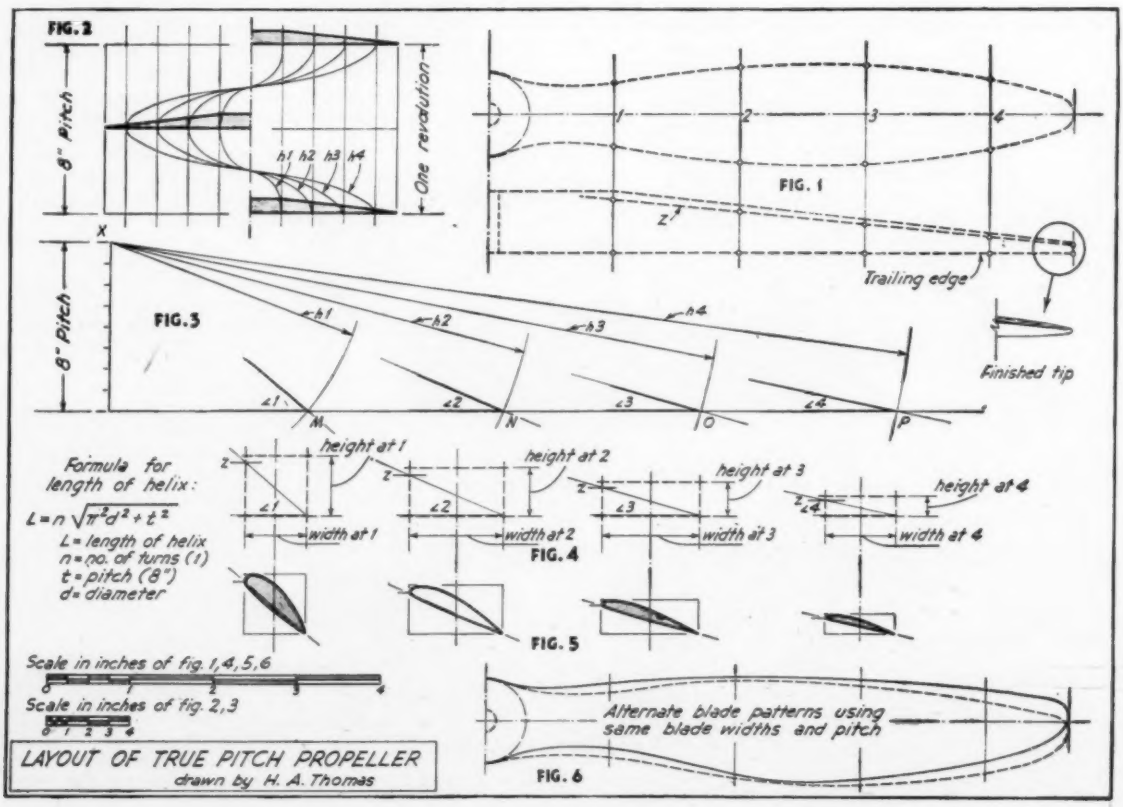
A PRETTY propeller is not necessarily a good propeller. It is true that neatness goes hand in hand with accuracy and efficiency; but in the case of propellers careful and accurate design is of a great deal more importance than appearance.

This article simply explains the author's understanding of the subject and is intended to acquaint those who may be interested with some of the basic facts of propeller design. Every effort has been made to keep this article as simple and as graphic as possible. If the inexperienced gas model fan can grasp these points, he will be able to design his own true pitch propellers.

"True pitch" is a phrase that is freely used regarding propellers, many of which are not what the words imply. To be correctly called "true pitch," a propeller must be so designed that all points along the blade can deliver their proportionate amount of traction or thrust. It would be practically impossible for a person to take a block of wood, sketch arbitrary blade shapes, taper the block by guesswork and complete a propeller that would be true in pitch. No doubt this procedure is used in a large percentage of all gas model propellers made, and while many of these may produce satisfactory results, it is logical to assume that performance would improve with more efficient design.

In attempting the design of an efficient propeller for a gas model, we will begin with our own specifications. In this case we will assume that the motor we plan to use is capable of turning a fourteen-inch propeller of eight-inch theoretical pitch. Due to a certain amount of slippage, our propeller will not operate at 100 per cent efficiency; so we refer to the eight inches of pitch as theoretical. We begin by making a tentative blade pattern and side view of the blade. At equal intervals from the center, along the centerline, we strike off four equally spaced points. For greater accuracy more points can be used, but we will use only four. Fig. 1. These points

(Continued on page 38)



Academy Of Model Aeronautics

A Division of the National Aeronautic Association

OFFICIAL MODEL AIRPLANE NEWS FROM ALL PARTS OF THE WORLD

CONGRESSMAN AIDS AEROMODELERS

Statewide affiliation with A.M.A. results from generosity and interest of Representative Randolph

THROUGH the cooperation of Jennings Randolph, member of the House of Representatives from the Second West Virginia District, novice model aviation flyers throughout West Virginia are now affiliated with N.A.A.'s aeromodeling division, the Academy of Model Aeronautics.

A short time ago it was pointed out to Congressman Randolph that a number of the younger model builders throughout the state of West Virginia were unable to compete in the many N.A.A. sanctioned meets because they did not hold an individual sporting license issued by the Academy. To meet this need, the Academy has an affiliated club program which permits the affiliation of a large number of novice flyers on a yearly basis. In most communities a sponsor is available to secure this affiliation for modelers but in the case of West Virginia, where the activity is under the direction of Carl A. Hopkins, of Clarksburg, as the representative of the Work Projects Administration, there are no sponsors nor did there appear to be the possibility of lining up an organization which would be willing to sponsor activity and affiliate the model flyers.

Congressman Randolph who has been interested in model aviation for quite some time and who is a frequent spectator at West Virginia meets, heard of the plight of the young aeronauts from his state and "dug into his own pocket" for the affiliation fee so the youngsters could carry on their flying under N.A.A. sanction and recognition. In securing the affiliation for Mr. Hopkins' state-wide organization, the West Virginia Modelers Club, Mr. Randolph said, "I feel certain that other men in public and official life will want to help in this splendid movement."

For the first time in their history all novice flyers in West Virginia are now affiliated with the Academy of Model Aeronautics. Their association with the Academy was made possible through a public-spirited individual who recognizes the important role of model airplane activity and the desirability of as many youngsters as possible participating in it.

1941 Sanctioned Meets

April 20, 1941—PINE VALLEY (BERLIN), N.J. Spring Meet of S. J. G. M. A.

July 3, 4, 5, 6, 1941—??? Dates reserved for 1941 National Championships.

September 21, 1941—PINE VALLEY (BERLIN), N.J. Fall Meet of S. J. G. M. A.

PHILADELPHIA, PA. "Closed" competitions (open to club members only) of the Philadelphia Model Aeroplane Association. Outdoor meets at field near Castor Ave. & Magee St. in Philadelphia; indoor meets at 108th Field Artillery Armory, Broad & Diamond Sts., Phila. Indoor championships in the large Convention Hall. Victor R. Fritz, Field Director, 1427 Spruce St., Philadelphia.

1941: January 4, 18; February 1, 15; March 1, 15, 29; April 12, 26; May 3, 10, 17, 24, 31; June 7, 14.

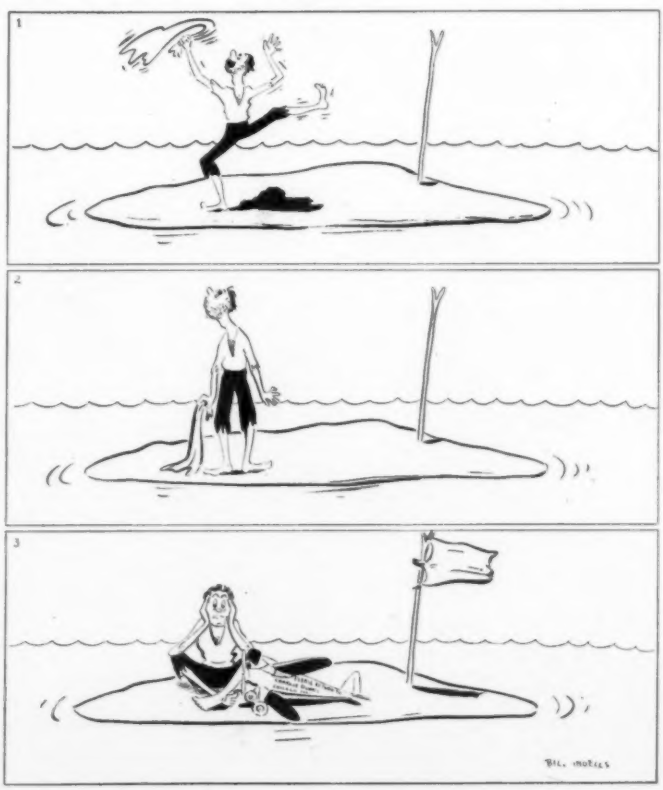
Yearly Records And National Perpetual Records Proposed

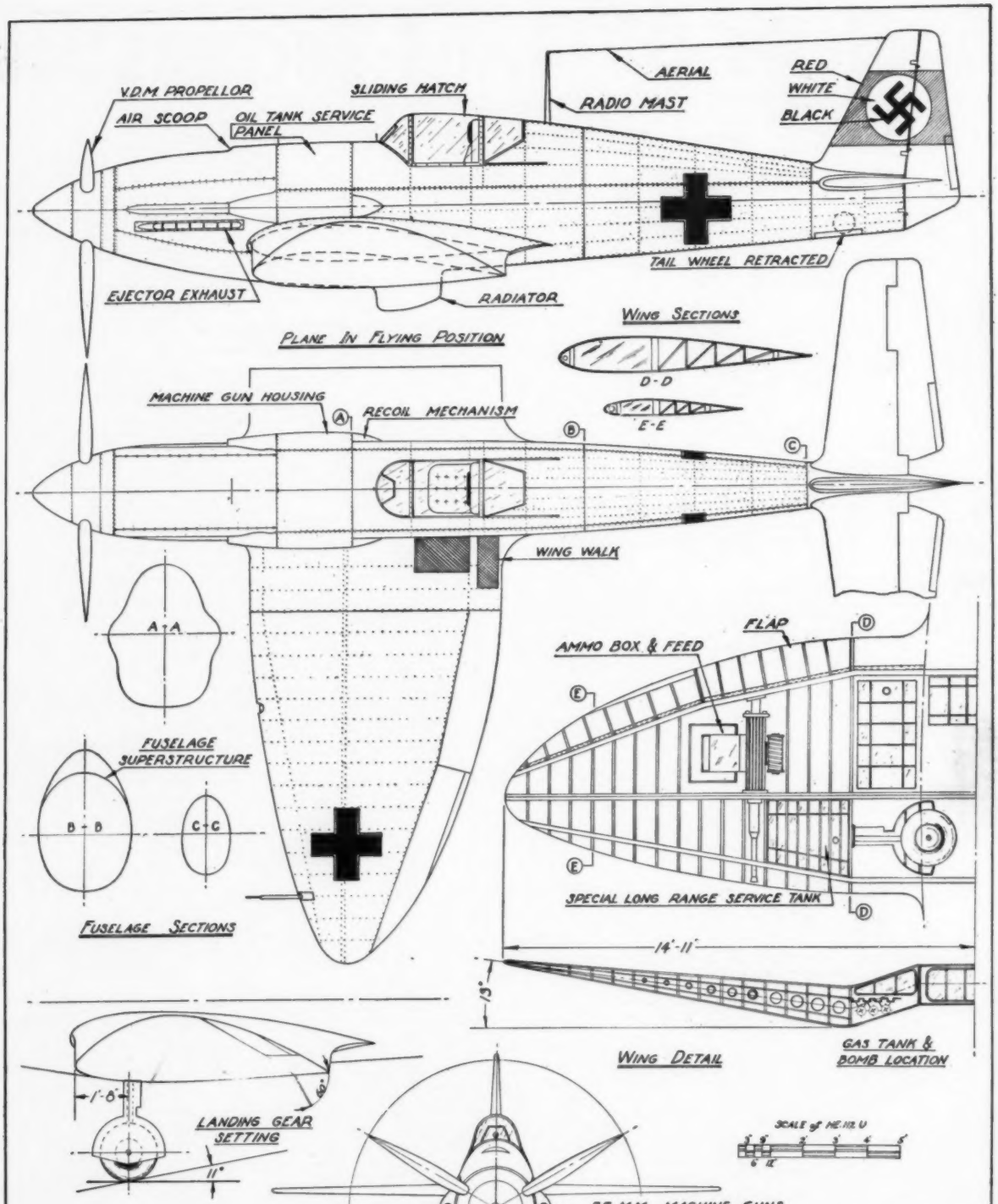
In keeping with its aims and purposes of advancing the sport of model aeronautics, the A.M.A. through its contest board, presents for the consideration of its members the following plan for the recognition of model aircraft records.

The view has been expressed that past aeromodeling achievements were not being properly preserved to authenticate the remarkable flights made with model aircraft under accepted standardized national regulations. Whenever new rule changes were required to keep abreast of modeling progress, the slate was wiped clean of all old records and started anew, even in categories which were not affected. This system has been termed inadequate because when old regulations were re-established, former records made under the same regulations were unable to be recognized. Consequently, flyers who advanced to other age classifications no longer had the opportunity to regain former records with new record-breaking flights.

For these reasons it has been suggested to the A.M.A. Contest Board that two types of records be recognized. One group would be set up as Annual Records to publicize high-time flights made during the year, while the second and more important group would be classified as National Records and these would continue through the years until either superseded or until new rules changed specific categories. Then only those National Record categories which were affected by the rule changes would be displaced. These performances would be kept on file as they are now, and should any old rules be officially re-established, the former National Records would automatically

(Continued on page 40)




V.D.M. PROPELLOR
AIR SCOOP
OIL TANK SERVICE PANEL
SLIDING HATCH
AERIAL
RADIO MAST
RED
WHITE
BLACK
TAIL WHEEL RETRACTED
EJECTOR EXHAUST
RADIATOR
PLANE IN FLYING POSITION
WING SECTIONS
D-D
E-E
MACHINE GUN HOUSING
RECOIL MECHANISM
WING WALK
A-A
FUSELAGE SUPERSTRUCTURE
B-B
C-C
FUSELAGE SECTIONS
FLAP
AMMO BOX & FEED
SPECIAL LONG RANGE SERVICE TANK
14'-11"
1'-3"
WING DETAIL
GAS TANK & BOMB LOCATION
1'-8"
LANDING GEAR SETTING
7.7 M.M. MACHINE GUNS
20 M.M. CANNON
6'-0"
Heinkel 112-U
LEONARD WIECZOREK
1/27/40

AIR YOUTH OF AMERICA

News of Importance to Modelers

IMPORTANT news for the model builders is the scholarships for training in aviation which have just been announced by Air Youth of America. Air Youth, in case there is still anyone who hasn't heard about its work, is the national organization founded by Winthrop Rockefeller, which is dedicated to helping young aviation enthusiasts find their place in the national program of aviation development.

In announcing the scholarships, on a nation-wide radio program, Thomas H. Beck, Air Youth's president and a director of the National Aeronautic Association, declared that they had been given in "recognition of the importance of the part played by youth in the nation's aviation program." Participating in the radio program with Mr. Beck were Mr. Rockefeller and Mr. William A. Patterson, president of the United Air Lines, and a donor of one of the scholarships.

With a value of more than $4000, the scholarships were described by Mr. Beck as being "the first step in a long-range educational program, by which Air Youth plans to assist qualified youth who would not otherwise be able to advance their aviation training."

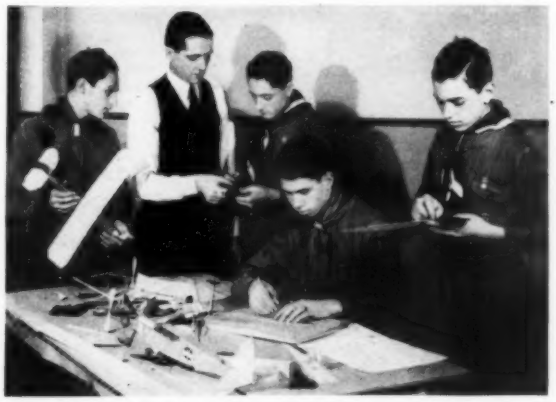
The scholarships will permit the winners to obtain advance training in aeronautical engineering, air transport maintenance, aviation mechanics in three schools; one located on the Pacific Coast, one on the East Coast and one in the Southwest.

Awards will be made by a scholarship committee, of which Mr. Beck is the chairman, and includes Sanford Bates; W. A. M. Burden, a director of the National Aviation Corporation; Lester D. Gardner, vice-president of the Institute of the Aeronautical Sciences; Charles W. Grant, editor of MODEL AIRPLANE NEWS; Dr. Robert W. Hambrook, United States Office of Education; Col. G. deFreest Larner, general manager of the National Aeronautic Association; Mr. Patterson; and Edward P. Warner, Civil Aeronautics Board.

Scholarships will be awarded in May, 1941, for school terms beginning in the Fall of that year. It is planned to make these scholarship awards annually, Air Youth has announced.

Basis of the awards will be promise of achievement in aviation, as demonstrated by the boy's accomplishment in some youth activity related to aviation and by his school record. Boys who will be graduating from high school in June, 1941, or have graduated within the past three years will be eligible for the scholarships.

Boys who have established records of achievement in the building and flying of model planes will be given special consideration, it has been pointed out, as will boys who have proved proficiency in gliding and soaring, aviation radio or similar fields. Boys who have established records in national or recognized state aviation model aircraft meets will be regarded as having demonstrated outstanding promise of achievement, Mr. Beck said.



Tech. Director Art Vhay helps a Boy Scout group

The Air Youth scholarships are offered for three well known aviation schools, accredited by the Civil Aeronautics Authority. They are:

1. *United Air Line Scholarship at the Boeing School of Aeronautics, Oakland, California.*

The winner of this scholarship may select one of the following courses:

Two-year course in airline operations and engineering. (tuition value $1,440)

(Continued on page 50)

The Heinkel He. 112

Interesting Details of a Famous Plane and How to Build a Scale Model of It

By GORDON A. REEVES

IF THE reader will probe far back into his memory he will remember the very famous Heinkel He. 70, which was a low-wing mail plane. At the time it appeared it was given wide acclaim as one of the smoothest formed planes of all time. That is a broad statement to make for any airplane, but it justly deserved it. The Heinkel He. 112 was designed from data obtained in tests with this mail plane. It does not detract from that statement in any way.

One need only look at the following figures to get the idea that this machine is an unusual one. The span of the main plane is 29' 10" and the length is 29' 7"; a difference of only 3". In other words, this machine is almost square and up to the present time the only airplanes to even approach this have been sawed-off special racers. The wing area is approximately 183 sq. ft., while the aspect ratio gives another hint as to the oddness of the design. It is 4.86 to 1. Compare this figure with an ordinary pursuit, or to really get a comparison, look at the British Hawker "Hurricane."

The wing consists of three spars, metal ribs of heavy construction, and the whole covered over with smooth, stressed skin. The main spar is stabilized by the use of vertical stiffeners. There are fourteen ribs in the outer panel of the wing. That portion of them before the front spar are formed out of duraluminum while the rest of the ribbing from there back to the center spar is built up solid. The back trailing edge sections of the ribs are built up from small sections of metal in a truss manner. Negative dihedral is given to that section of the wing which joins the wing to the fuselage. This is done in order to shorten the length of the undercarriage and thus save additional weight and space.

The aileron and flap that are fitted to the trailing edge are fabric-covered, running almost the complete distance of the wing. The two 20 mm. cannon are fitted into the main spar in this outer wing panel section. They take up considerable space and pass completely through the two front spars. A fuel tank is also carried in this portion of the wing.

Six 22-lb. fragmentation bombs are fitted in the wing when the He. 112 is used for light bombing attacks. The position of these is shown in the drawing which accompanies this article. The positions of the other armament can be readily seen from the three views also.

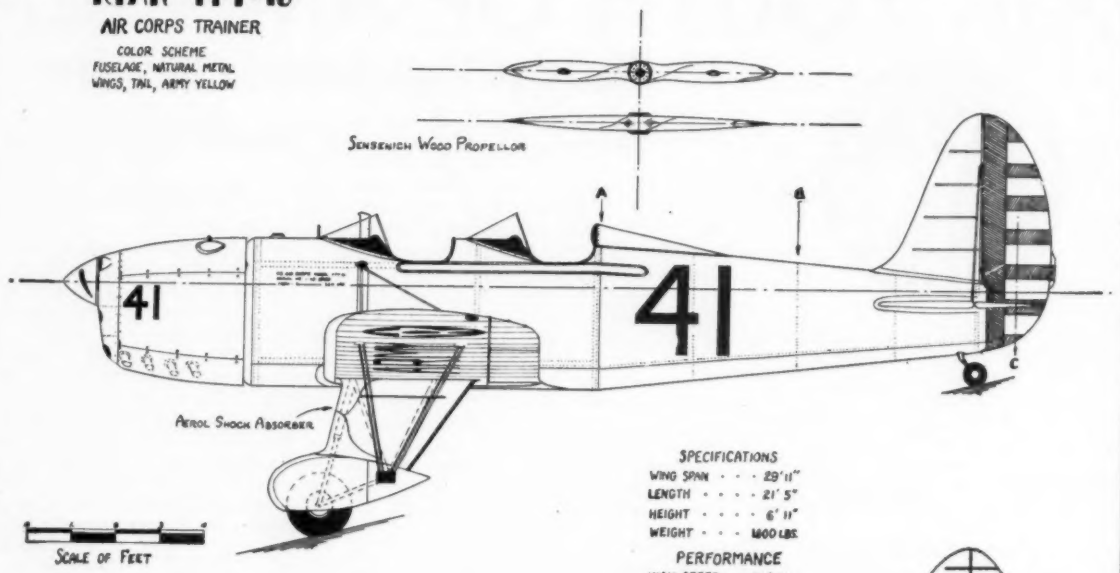
The fuselage is monocoque and covered with a smooth skin which is flush riveted to gain much needed miles per hour. Heavy frames of "top hat" section are connected by light stringers with the skin riveted to

(Continued on page 38)

RYAN YPT-16

AIR CORPS TRAINER

COLOR SCHEME
FUSELAGE, NATURAL METAL
WINGS, TAIL, ARMY YELLOW

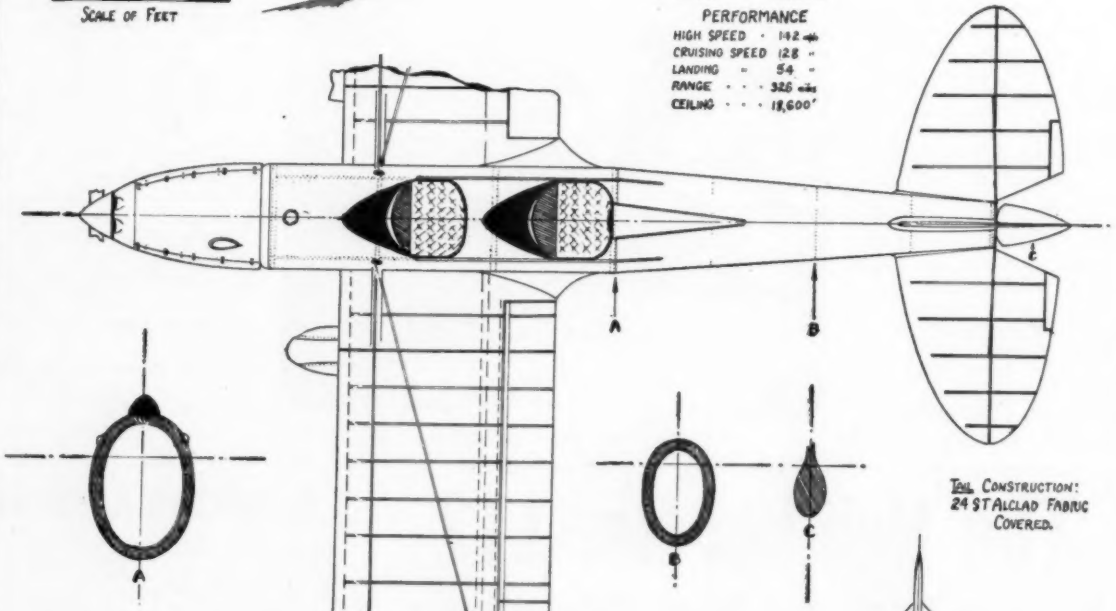


SPECIFICATIONS

WING SPAN	29'11"
LENGTH	21' 5"
HEIGHT	6' 11"
WEIGHT	1400 LBS.

PERFORMANCE

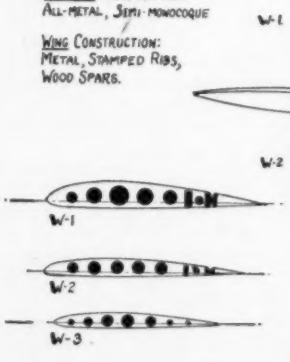
HIGH SPEED	142 mph
CRUISING SPEED	128 "
LANDING	54 "
RANGE	326 miles
CEILING	18,600'

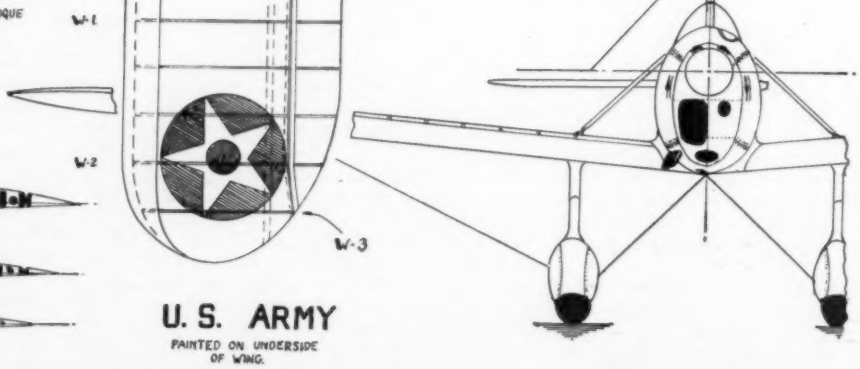


TAIL CONSTRUCTION:
24 ST ALCLAD FABRIC COVERED.

FUSELAGE CONSTRUCTION:
ALL-METAL, SEMI-MONOCOQUE

WING CONSTRUCTION:
METAL, STAMPED RIBS,
WOOD SPARS.

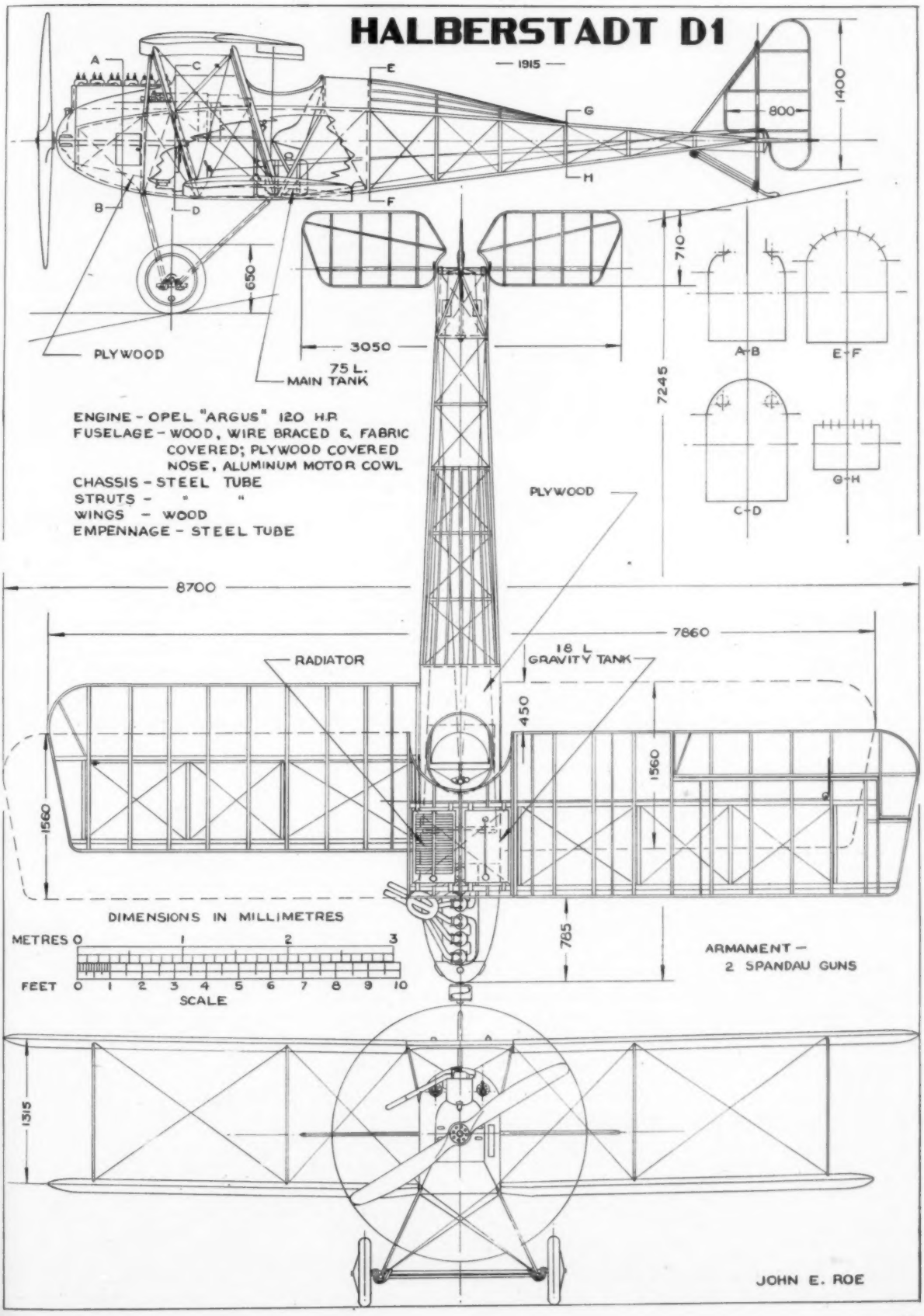


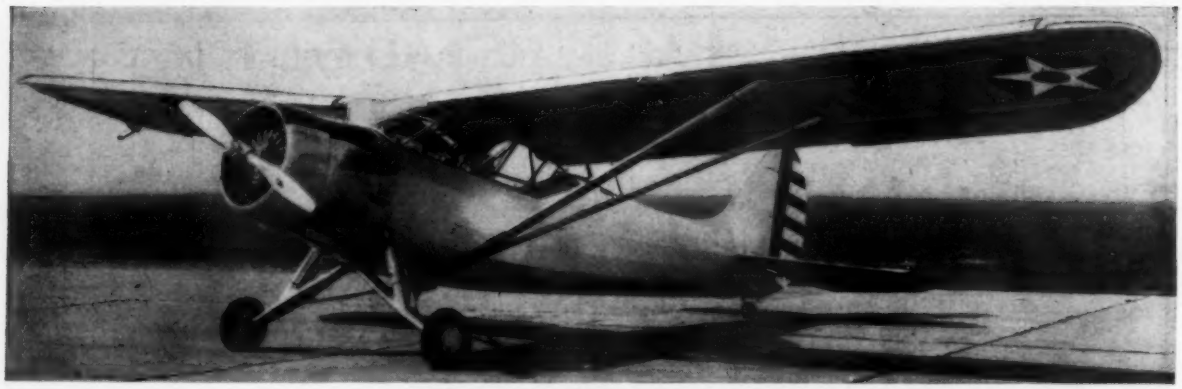


U. S. ARMY

PAINTED ON UNDERSIDE OF WING.

L.J. CAMPBELL


HALBERSTADT D1
— 1915 —
A
B
C
D
E
F
G
H
1400
800
650
710
7245
3050
PLYWOOD
75 L.
MAIN TANK
A-B
E-F
C-D
G-H
ENGINE - OPEL "ARGUS" 120 H.P.
FUSELAGE - WOOD, WIRE BRACED & FABRIC COVERED; PLYWOOD COVERED NOSE, ALUMINUM MOTOR COWL
CHASSIS - STEEL TUBE
STRUTS - " "
WINGS - WOOD
EMPENNAGE - STEEL TUBE
PLYWOOD
8700
7860
RADIATOR
18 L
GRAVITY TANK
450
1560
1560
DIMENSIONS IN MILLIMETRES
METRES 0 1 2 3
FEET 0 1 2 3 4 5 6 7 8 9 10
SCALE
765
ARMAMENT —
2 SPANDAU GUNS
1315
JOHN E. ROE



This new observation plane, a Stinson O-49, was recently delivered to the Army at Wright Field. It is powered with a 250 h.p. engine.

FLASH-NEWS

Special To Model Airplane News

ARMY: Culmination of a 30 year battle, led for a period by the late Brig. Gen. Billy Mitchell, who got a court martial for his vehement convictions, came recently when Major-General H. H. Arnold was appointed Deputy Chief of the U. S. Army General Staff and the General Headquarters Air Force's Delos C. Emmons was promoted to Lieutenant-General to become the air corps' Number One flying officer. Emmons, the first air corps officer to reach this high rank, made immediate plans for increasing the air strength of the U. S. from 4 wings to 17, from 25 combat groups to 54, from 45,000 enlisted men to 163,000. Pilots (12,000 a year) and planes (15,000 a year) will take care of themselves. The G.H.Q. Air Force now moves under the direct command of the General Staff and the temporary Chief of the Air Corps, Major-General George H. Brett, will handle only training, procurement, research, etc.

Other changes include the division of the U.S. into four air districts with headquarters at Hartford, Conn. (Northeast), Tampa, Florida (Southeast), Spokane, Washington (Northwest) and Riverside, California (Southwest). These air district divisions will take some of the strain off general headquarters in Washington (where it recently moved from Langley Field) and place responsibility and authority on the four brigadier-generals placed in their command.

Definite plans for the utilization of the vast American automotive industry in aircraft manufacture have been made with the announcement by the President that two huge new plants would be erected for the assembly of 12,000 bombing planes, parts for which will be fabricated by automobile manufacturers. The planes will be Boeing Flying Fortress, Douglas and Martin bombers and Ford, General Motors and Chrysler will all share in the work. Title to the assembly plants will be retained by the Government.

First production model now being delivered to the U. S. Air Corps of the formidable Bell Aircuda is known as the YFM-1A (service test status) and design changes include a tricycle landing gear and redesigned bombardier quarters in the nose. Armament comprises two 37-millimeter cannon, two 30 caliber machine guns firing out of rear side-turrets and two 50 caliber machine guns mounted on the top deck and below the fuselage. Crew is made up of five men and top speed has been upped to 390 miles per hour. The P-39A Aircobra production model has also been delivered; changes including additional wing guns and an experimental rear-firing gun in a tail tunnel. About 1600 Aircobras, the world's fastest fighting plane, are on order, divided half-and-half between our air corps and Great Britain's Royal Air Force.

This is the traditional month of air corps trophies. The Daedalian Air Trophy for safety in service flying has been awarded to the first wing of the G.H.Q. Air Force, stationed at March Field and flying Boeing B-17B's. The Columbian Air Trophy, also for safe flying, goes to the Seventh Bombardment Group at Salt Lake City with Douglas B-18A's.

The famed Frank Luke Trophy for aerial gunnery goes to First Lieut. Troy Keith of the 55th Pursuit Squadron, Hamilton Field, San Rafael. The trophy is annually awarded at Phoenix, Arizona, Luke's home town, and the entire squadron of 18 Curtiss P-36A's will attend the ceremony. Possessed of a fabulously accurate eye, Lieut. Keith has also won the Flourney and Harris Cups for aircraft machine-gunning in the past year.

The air corps' first fully-equipped Air Ambulance Unit is being formed at Washington's Bolling Field. Re-worked Douglas C-33 twin-engine cargo transports will equip the Squadron and an Air Ambulance Battalion composed of infantrymen will man the unit. Time, criteria in life-saving, is expected to be beaten in aerial races from the battlefield to base hospitals by these fast flying ambulances.

The 18th Pursuit Squadron, under Captain Norman D. Sillin, has been transferred from Hamilton Field, California, to Elmendorf Field, air corps' new air base near Anchorage, Alaska.

New bases: A new air corps base will be constructed at Fresno (Calif.) Municipal Airport. Cost will near one million dollars and 175 officers; 1500 enlisted men will be stationed upon completion. Sites for the U. S. new air and naval bases in Bermuda have been selected and surveyed and approval is awaited from England before construction begins. Rear Admiral William D. Leahy, Governor of Puerto Rico, states that the new U. S. Navy Air Base there will be completed next July, one year ahead of schedule.

DOES ENGLAND NOW HAVE OUR AIR CORPS BOMB-SIGHT? Reports, stories, accusations and accusals have filled the Congressional air over this question. A bomb-sight is only as good as the man behind it, for he it is that sets the various knobs and handles with the ultimate settings being determined by long-shot guesswork on his part as to speed, wind, altitude, air currents, etc. There is reason to believe that the German, British, French and Italian bomb-sights are very nearly on a par. Our officers have hit battleship-outlines on bombing ranges from 14,000 feet and can hit a target 200-feet square from 24,000 feet consistently. This is the result of superior technical training not a "secret" bomb-sight; for in the final analysis, a bomb-sight is only an elaborate model of the familiar telescopic rifle sight. In addition, you can't hit anything you can't see, and bombing from 24,000 feet is only accurate on CAVU days, about two dozen out of the year in the war zone. Let Congressmen learn a few simple facts before waxing eloquent and calling high-ranking army and navy officials names over something the average Congressman knows nothing about. The subject of Flying Fortresses for Great Britain is also mentioned in this altercation. Available Boeing B-17's (original standard model) WILL be exported to England. The model B-17D is much improved in speed and armament and will keep Uncle Sam well armed in this department.

(Continued on page 72)

AMERICA'S NEW "OPEN" Champion!

MEGOW'S Ranger

MATHEW KANIA'S WINNER OF SIXTEEN CHAMPIONSHIP CUPS

GIANT FLYING SPITFIRE

50-in. wingspan flying models of the British fighting favorite. Complete kits $1.00. By mail, postage 15c extra.

GIANT FLYING STUKA BOMBERS

50-in. wingspan models of the German Junkers Dive Bomber JU 87B. Complete kits $1.00. By mail, postage 15c extra.

AVIATION is a fast-changing industry, and Megow model airplanes keep right in step. Every month Megow brings out something new, and model builders who watch Megow announcements and catalogs are in touch with the very latest developments.

In the gas model field, this month, Megow announces the RANGER, a sensational dual class model that has already garnered 16 big prizes for its designer! Primarily a Class B model, holding the National "Open" record, it can also be flown as a Class A with a smaller motor . . . the Megow "199." Span, 46 inches. Wing area, 325 square inches. Weight, ready to fly, 18½ ounces. Price only $1.50 at your dealer's. By mail, 20c extra for postage and packing.

Offering the most extensive line of hobbycraft kits, parts and supplies in the world today, the big new 132-page Megow catalog is a real handbook for every builder of model airplanes, ships and railroads. Send 10c for your copy today!

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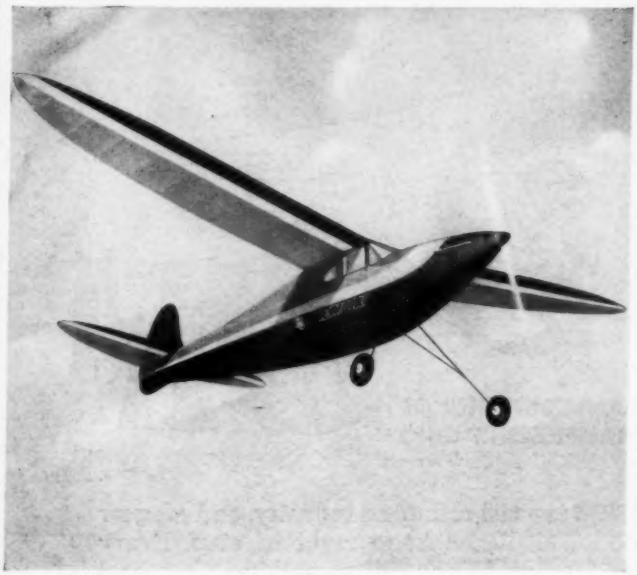

45" WINGSPAN **$1.00** **POSTPAID** or at your dealer

The way model airplane builders have taken to Scientific's "ALL AMERICAN" is proof of the patriotism that still rings in the good old U.S.A.! Show your colors! Build the "ALL AMERICAN"! Designed to fly, it has consistently made long, graceful endurance flights of two miles and more! It's dashing red, white and blue color scheme will capture your heart! Features include: removable tail assembly, removable and adjustable wing, removable nose plug unit, and adjustable tab rudder. Complete Kit is only $1.00 postpaid or at your dealer.

"Yellowbird"

Just one of Scientific's four new 30" models.

50¢

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Here's a contest-type model that will make your fellow contestants sit up and take notice at the next contest you enter. Designed for consistent endurance flights.

Scientific's New 1941 Bargain Catalog

34 Pages—chock full of new flying thrills! Hundreds of illustrations and easy-to-read text on the many new plane kits, motors, speedway racers, speedboats, etc. Send.....

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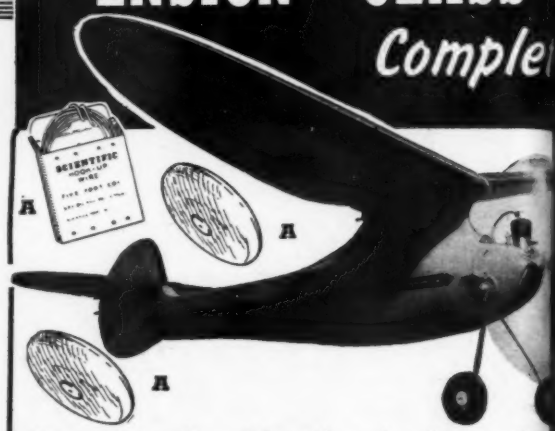

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A—"ENSIGN" KIT....*Sells Regularly*
COMPLETE including: HOOK UP WIRE, WHEELS, PROP and BATTERY BOX MATERIALS.

B—MODEL KNIFE ...*Sells Regularly*

C—TIMER.....*Sells Regularly*

D—BOTTLE OIL .....*Sells Regularly*

E—TEST BLOCK .....*Sells Regularly*

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TOTAL VALUE.....

NEW! SYNCRO B-30 MOTOR KIT—$3.95 . . .

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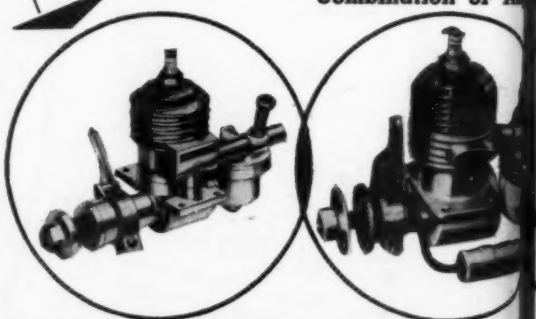

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COMBINATION 3.95
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Complete with Motor...**$10.90**

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COMBINATION .....
(Kit and Accessories)
Complete with Motor...

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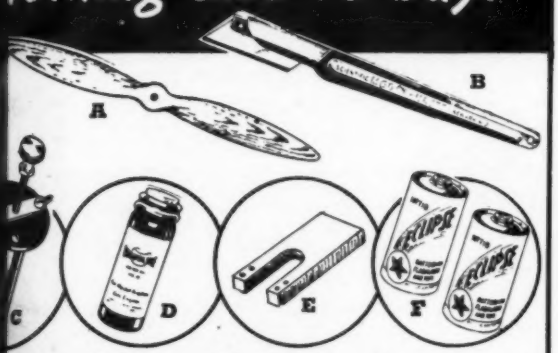

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$3.95 FOR EVERYTHING

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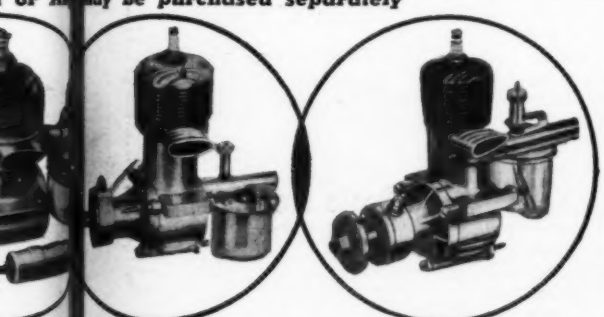

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TER "29" MOTOR...$15.50
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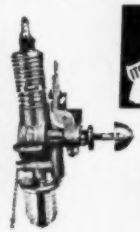

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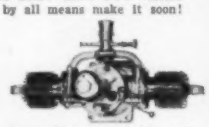

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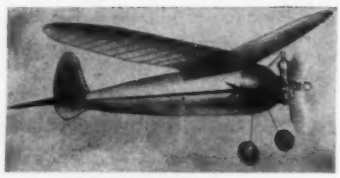

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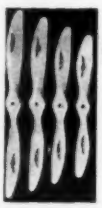

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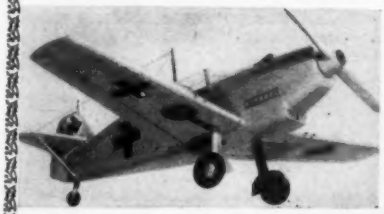

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The Heinkel He. 112

(Continued from page 31)

these. The motor mount is a magnesium-alloy casting of cantilever construction.

The tail surfaces are very rectangular in appearance. Additional area had to be added to counteract the large, side, "wetted surface" with the large DB-601A engine. Trimming tabs are installed on all surfaces. The rudder is mass-balanced. Camber changing flaps are used but are not as efficient as they could be if properly designed.

Data on the Heinkel 112 fighter (powered by DB. 601A motor):

Performance: Max. speed, 358 mph at 12,300 feet; cruising speed, 282 mph at 13,120 feet; stalling speed, 90 mph; rate of climb, 2,760 feet per minute; service ceiling, 31,170 feet; normal duration, 2.6 hours (at a speed of 282 mph)—range of 715 miles; overload duration, 6.8 hours (at a speed of 236 mph)—range 1,555 miles. Weights: Empty, 4,200 lbs.; loaded, 5,740 lbs.; disposable load, 1,540 lbs.; pilot, 200 lbs.; radio, 44 lbs.; fuel (normal), 943 lbs.; oil, 88 lbs.; armament (etc.), 265 lbs. Loadings: Wing, 31.4 lbs. per sq. ft.; power, 5 lbs. per hp.; span, 6.5 lbs. per sq. ft. Dimensions: Span, 29' 10"; length, 29' 7"; wing area, 183 sq. ft.; aspect ratio, 4.86 to 1.

Everyone will want to build a replica of this exceptionally smooth-looking German fighter, not only because of its snappy appearance but also because of the simplicity of all the necessary parts.

The fuselage is made by taking tracings of the top and side views of the plane and redrawing these on the correctly proportioned balsa block. It would be wise to exclude the machine gun "bumps" for the present. These can be added later by cementing small slivers of excess wood to the completed fuselage.

The pilot's canopy is best made from slivers of bamboo, covered over with clear photo-film. In order to give the model that extra finesse, it would be wise to construct a replica of the visible portion of the pilot's "pit."

Sand the fuselage with very fine sandpaper; it is best to fill the wood pores with wood filler. This procedure will assure a fine paint-job later on. All details such as rivet lines, plate joints, insignia, etc., can then be put on with India ink. This last job will take much patience on the part of the builder and will make or break a prize-winning model.

The tail surfaces are simply cut from balsa and then sanded to a smooth finish. The swastika is then added.

Four distinct sections make up the construction of the wing. The outer panels, which extend to the landing gear position, are easily formed. Use the cross-sections to check your work. The negative dihedral portion, extending from the "gear" to the fuselage, is a separate piece.

The radiator and wheels can be made from solid balsa blacks and the landing "gear" from sheet stock. The color scheme is left to the builder's discretion; however, we suggest camouflage.

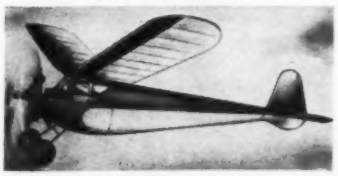
A True Pitch "Gas Prop"

(Continued from page 28)

will be known as 1, 2, 3 and 4. When the propeller is rotating, these points follow spiral paths. or more specifically, "helical" paths. In other words, in one revolution, each point inscribes a separate "helix." Fig. 2. To find the true length of a helix, we must know the pitch, the diameter and the number of turns. The pitch will be eight inches, the diameter will be twice the distance of each point from the center and the number of turns will be one. By applying these to the formula shown on the drawing, we can find the true lengths of the paths these points follow in one revolution. We will call these lengths h1, h2, h3 and h4. To show more clearly the distances covered, Fig. 3 shows these helices straightened out. This plainly indicates one relationship between points along the blade. It further shows why the portion of the blade nearer the tip need not have a large angle of pitch to produce the proper amount of traction.

In constructing Fig. 3 we will draw a long base line and at one end erect a perpendicular. On this perpendicular we will measure accurately the desired eight inches of pitch and label that point X. With a long arm compass or a string, we will measure h1, and with that as a radius and X as a center, we will strike an arc through the base line and label the intersection M. Using h2, h3 and h4 in a similar manner, we can arrive at points N, O, and P, all being on the base line. By connecting M, N, O and P with X, we have a diagram of the paths of points 1,

Aviation!



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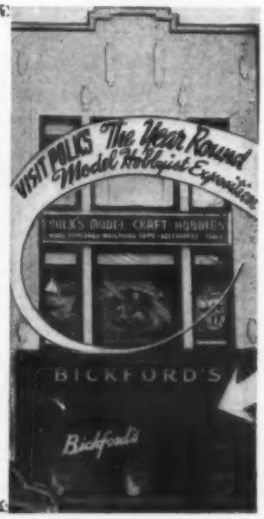

2, 3 and 4 in one revolution—each at eight inches of pitch. We will label the smaller angles formed at the base line as ∠1, ∠2, ∠3 and ∠4.

Back to Fig. 1 note line Z. This is the tentative entering edge line. Since the blade sections have an aerofoil, line Z is located in its position due to the upper curvature of the blade. In Fig. 4 we have reconstructed the four angles over which we superimpose the block cross-sections at their respective points. Our task now is to adjust the blade widths and thicknesses so that we can make the upper legs of the angles pass through point Z at each station. For this reason we have previously referred to these patterns as tentative.

To be structurally sound, the blades should taper toward the tips in the same manner that a cantilever wing is tapered. With this in mind, we draw in the blade sections. Fig. 5.

It might be pointed out that there can be numerous types of propellers laid out, all of which can be true in pitch. The reader need not feel that incorporating these points of design will necessarily restrict him from using his favorite type of propeller. Fig. 6 shows alternate blade patterns with the same pitch and blade widths used in Fig. 1.

The World Record Flapper

(Continued from page 15)

outline, as this will weaken it. Now glue the caps and former into place. To make the crankshaft, obtain a straight piece of No. .020 music wire. At one end bend a hook as in the drawings, insert the dural bearing (detailed in the plans) and two washers. Three-quarters of an inch from the end of the hook make a sharp right angle bend. Measure 5/8" and make another right angle bend which places the two ends of the wire parallel and pointing in opposite directions. When laid upon a smooth flat surface all parts of the crankshaft should lay flat upon the surface. This part is simple but important for smooth operation.

The crankshaft is attached to the motor stick by gluing the dural bearing to the very front of the tube. Care must be taken that it is parallel to the center of the tube. This type of crankshaft is far superior to the Bell type of double arm crankshaft because (1) it is lighter (2) it has less vibration which allows the model to be made lighter.

A rear motor hook is bent from the same size wire and glued in place.

From 5/64" medium balsa sheet cut the tail boom. It tapers from 3/32" x 5/64" to 3/64" square and it is 5-7/8" long. The corners should be slightly rounded with fine sand paper.

Center Section

Working upon a full-size pattern, the four sides of the rectangular frame for the center section are cemented together, using medium 1/16" squares.

Cut ten ribs 1/32" x 1/16" from 1/32" sheet balsa. Seven of these ribs are laid aside for use in the tail works. The other three are glued in place upon the frame. From sheet aluminum cut four strips 1/16" x 5/16". In one end of each punch a hole just large enough for the wire wing fittings to fit into snugly, yet loose enough to turn easily. Glue in place as shown on the plan.

Tail Assembly

Make a full-size pattern of the elevator and rudder to work on. Next from 1/32" sheet-wood cut the leading and trailing edge spars. They are placed upon a full-size plan. The ribs, cut previously, are trimmed to shape by cutting from the trailing edge and are glued in place. For the tips cut three strips 1/32" square and about 3" long. These are moistened and bent to shape over some hot instrument such as a soldering iron, heated pipe or what have you. They are trimmed to size and glued to the spars. It should be noted that the joints are cut at a sharp angle to insure a strong, straight joint. The rudder is made over a full-size plan using the same method of construction as just outlined. The elevator and rudder are now covered with either thick microfilm or superfine tissue.

Mechanism

The most important part of an orni-

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thopter is the mechanism for accentuating the wings. It is simple, but must be made accurately, light and strong. The crankshaft has already been made, the other necessary parts are two arms mentioned before and two connecting rods. The arms are 2-1/4" long and taper from 3/32" square to 1/16" square. They must be well cemented to the wing spars, advisably before the other parts of the wing, in order that the correct angles be duplicated identically upon both spars and giving an average dihedral of 2". All these steps in making the mechanism must be done accurately and symmetry of right and left sides maintained, so that when completed the necessary flapping motion will be correct and well-timed. If one panel moves through a greater or lesser angle poor control of the flight will result. If any of the wire fittings are out of alignment there will be vibration and a tendency for the mechanism to tear itself apart.

These precautions are not to make the project sound deep and complex, as it is not. They are little things gleaned from experience which are being passed on to you so that you will not be hindered as we were with our first experiments.

The connecting rods are 1/16" square hard-balsa, the bearing holes being 2-1/16" apart. These rods are given several coats of cement on the ends, pierced and the insides of the holes covered with cement. This gives a tube-like bearing surface, preventing excessive wear and friction. To prevent binding and to keep the conrods in place, three 1/16" cubes are cemented onto the crankshaft in such a manner that the conrods are sandwiched between them. Cubes are also cemented to the ends of the No. .010 wires on the arms so that the conrod will not fly off when in operation.

Assembly

The center section is covered with superfine and mounted on four braces 1/16" x 3/32" x 2" front 2-1/16" square x 2" rear, the corners of which are rounded off. To assure firm joints, give a second coat of cement after the first has dried. The wing is mounted on its hinges. The ends of the rear wires may be bent over for a permanent wing attachment or 1/16" square cubes may be cemented to the ends, if it is desirable to knock-down for transportation. Also 1/8" squares of rubber forced over the wire may be used. The elevator is cemented to the top of the tail boom and the rudder to the bottom. The boom is cemented to the rear of the motor stick with a piece of aluminum wire 3/4" long. The original model flew with tail at the angle as suggested in the plans.

Flying

For power a 11" loop of 3/16" brown rubber, well lubricated, is used. In adjusting, gradually increase the number of turns by 200 each time the preceding flight has been successful. Although there is no propeller, there remains a slight torque effect which only results in the model circling to the right. Stalling and diving characteristics are remedied in the usual manner by varying the angle of the elevator, which is accomplished by bending the wire. The model climbs steeply in tight circles which gradually increase in diameter as the power diminishes.

Very little trouble will be encountered in adjusting this model, as it is one of the most inherently stable types of aircraft. After one gets accustomed to watching a model fly with this type propulsion and lift, and observing the stable flight characteristics, it no longer remains such a deep-shrouded mystery why our feathered friends seem so much at home and under such perfect control while in the air. For the dozen or so hours and the few pennies (5 to 10c) spent upon this model we are utterly confident that you will be repaid a hundred-fold in enjoyment and new knowledge acquired from practice and observation while flying it.

As a starter for your experimentation here are a few things I believe can be done to increase performance: (1) Make the model lighter (after building this one, which should be heavy for your first try). (2) Smaller cross-section of rubber for more turns. (3) Enclose the motor. (4) Higher aspect ratio wings. (5) Larger diameter crankshaft movement. (6) Placing some wing area, say 1/3 of the chord ahead of the spar. (7) A larger size model. (8) Symmetrical elevator section.

Academy of Model Aeronautics

(Continued from page 29)

be reinstated.

A good example to use would be Pete Andrews' sensational Indoor H. L. Stick flight of 26:29.0, made last September. This performance would be issued a 1940 Yearly Record certificate, and since it is the best flight ever made in Class C under existing rules, a National Record certificate would also be awarded.

At the beginning of the 1941 modeling season, as far as Yearly records are concerned, Andrews' flight would be removed from the books, but it would still maintain its National Record status.

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"What is this gas model flying all about, anyway? Is it a game, a sport, a hobby, a form of exercise, a nuisance, or what? Does it tell its followers anything about practical aeronautics and, if so, how much? Does it attract only queer people who are carried away by a craze, or can it have some appeal to sober-minded substantial folks? Are eventual crack-ups the only end and consequent waste of considerable time and money? Is there much real science involved, or is it pretty much cut-and-try? Should it be restricted to those who have proved capacity for responsibility? Maybe not all of these questions have occurred to you, but they have to me. I think some hard and clear thinking should be done by gas model flyers to put the sport on a sound basis of fundamental principles.

"My conclusion is that gas model flying should be primarily a sport, a competitive game which requires careful training and preparation, thorough knowledge of the equipment used, recognition of responsibility toward the property and persons of others, and an accepted code of fair play and good sportsmanship. Let's make the sport appealing and worth while to a lot of people that are just laughing at it now.

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Fort Wayne (Ind.) NEWS-SENTINEL
Chicago (Ill.) TIMES

The hearty response the affiliated club set-up met is an indication that the new program is exactly what was needed by many organizations who desire to tie in with Academy activities but could not under the former affiliated organization arrangement. It is expected that the new plan will bring the Academy to the attention of an ever-increasing number of novice flyers with the ultimate result that more and more licensed competition flyers will be participating in state, regional, and national competitions.

The Air Cadets of America, which is headed by Maurice Roddy, aviation editor of the CHICAGO TIMES, is the first national junior organization to be recognized by the Academy and N.A.A. as an affiliated group; and it is expected that many aggressive clubs will follow the lead set by the Air Cadets and the other aeromodeling chapters which have affiliated with the A.M.A., so that the list of Academy chapters is expected to continue growing.

New Edition Official Contest Manual

The new Contest Manual just published by the Academy of Model Aeronautics is the most comprehensive work of this type ever offered in the field of junior aeronautics.

As the official handbook for the activity, the new Contest Manual contains scores of charts, illustrations, official competition forms and detailed explanations of how to set up and run aeromodeling meets. Running more than 25,000 words, it presents the most inclusive compilation ever offered in this field.

The contest procedure is the culmination of five years of effort on the part of hundreds of model aviation leaders. One of its most interesting features is the inclusion of contributions by competition directors. These contributions present the latest ideas in promoting, publicizing

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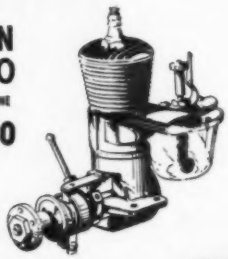

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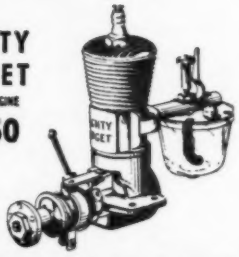

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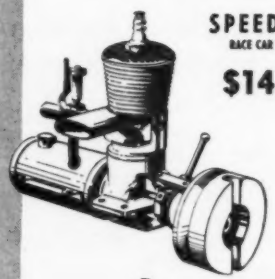

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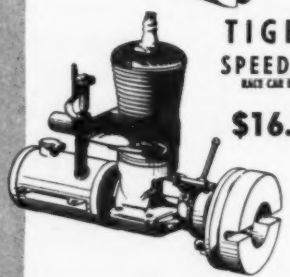

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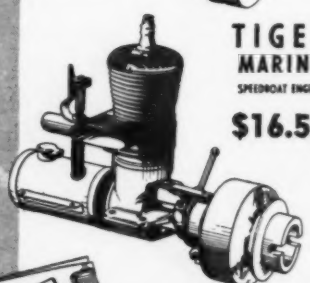

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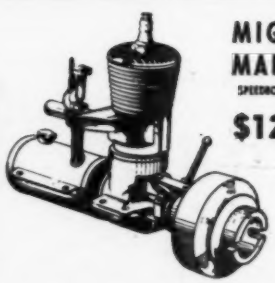

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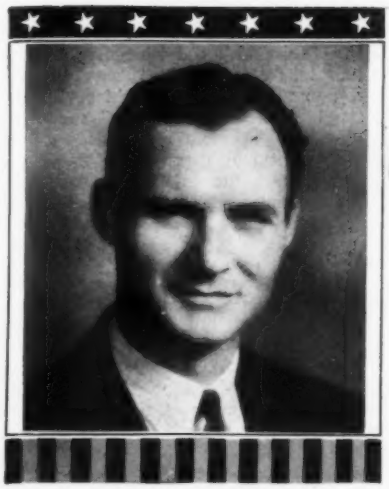

To you who have asked, Mr. J. D. Bunch answers this question, "What has honestly been accomplished with model engines to assure me unequaled horsepower per cubic inch displacement?"

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"The history of full size aircraft development shows the most significant gains in horsepower have been made through developments that permitted use of modern, power-yielding, high octane, aviation fuels.

"The Tiger is the first model aircraft engine able to utilize the power-yielding properties of Ethyl and high octane gasolines. Accomplished with the Tiger by using a 7½ to 1 compression ratio it is made possible only by the use of both a lapped steel piston plus two piston rings.

"Specifically, it is recommended you mix Tiger fuel: Ethyl gasoline 16 Oz., Castor Oil 8 Oz., Ether 1 Oz. (Ether used only to blend castor and gasoline). Not only better, this Tiger fuel gives longer motor life and superior lubrication.

"According to tests, at 8,600 R.P.M. which is the pre-tested and guaranteed speed using 12" Victory propellers, the Tiger registers 44/100 horsepower.

"A knowledge of engine horsepower is not complete without an understanding of how it can be used to best advantage. The Tiger is exactly in the middle of Class C, and is optimum size for models 4, 4½ to 5 sq. feet wing area (4 to 6 ft. wing span). Today's most sensational flights are made with Tiger-powered, high-wing, parasol airplanes. In smaller models 6 to 8 inches extra length easily built into the center wing panels will enhance soaring ability. A wing loading 8 oz. per sq. ft. at 36 oz. is thus obtained plus Tiger climb and get-away."

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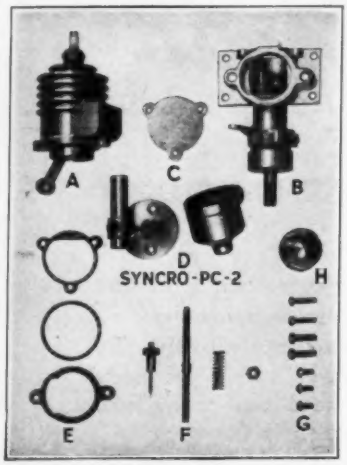

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A. Cylinder assembly, with spark plug, piston and connecting rod.
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E. Gaskets (cylinder, gas tank, crankcase).
F. Gas line, needle valve and spring.
G. Bolts. H. Front Hub Nuts, together with complete instructions for assembly.

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Stroke 9/16" — Weight 5½ oz.
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and conducting model meets.

Specially prepared for use by club leaders, recreation officials, sponsors and dealers, the Manual contains the official national and international regulations as well as special rules covering all types of experimental and exhibition models. Complete arrangements are detailed for setting up and conducting competitions ranging from simple beginners' contests to National Championships.

For the first time, helpful directions are given on how to prepare publicity stories for newspaper consumption and how to secure radio time. The latest national duration records are included, as well as a "break-down" on the various types of models which can be flown for these records.

The Official Academy Contest Manual sells for 50c postpaid. Inquiries and remittances should be addressed to the Academy of Model Aeronautics, Willard Hotel, Washington, D.C.

A Miniature Flying "Cadet"

(Continued from page 22)

sheet since the curve is uniform. Use soft balsa and cement it to the adjacent frame. Below this covering, separate pieces of very soft 1/8" sheet are fitted snugly between the formers and stringers and when dry the "filled-in" areas are cut to the correct shape. The extreme front of the nose is made removable to permit the rubber motor to be stretched for winding. Roughly cut the nose block to shape and then lightly cement to the fuselage and sand the entire front smooth and uniform. Remove the nose block and cement a piece of 1/8" thick stock to the back so it will fit to the opening in section A-A.

Landing gear struts are .034 music wire; the size of each strut being indicated on the plan. Once the struts are formed, they are attached to the fuselage by thread bindings. Front and back struts should be joined with solder. 1/16" sheet is used to fill the space between the struts; do not attach the balsa struts, however, until the fuselage has been covered. Wheels may be purchased or they can be made from discs of 1/8" sheet that have been laminated together.

Tail Surfaces

Since any excessive weight behind the center of gravity must be balanced by additional weight in the nose, the tail surfaces must be kept light. Both stabilizer and rudder are constructed in a similar manner. In the interest of greater strength the stabilizer is built in one piece. Outlines are cut from 1/16" sheet, ribs are 1/16" square and spare are 1/16" x 1/8" strips. When dry, the frames are removed from the plan and very soft pieces of 1/16" square cemented to both sides of the ribs. Ribs are cut streamlined when the cement has dried. Cut and sand the surfaces to their final shape.

Wing

Because of the limited space, only one-half of the wing could be reproduced on the plan, so make a full-sized layout on a large sheet of paper and work can be done directly on it. Taper and sand the trailing edges before pinning them into position over the plan. With the exception of the two 1/16" thick end ribs, the wing ribs should be cut from 1/32" sheet. Pin the ribs to their respective positions and then attach the leading edges and spars. Assemble the tip pieces which are cut from 1/8" sheet and then cement the tips to place. Once the leading edges and tips are cut and sanded to their proper shape, the wing frames are completed.

Propeller

For best flight performance the model must be equipped with an efficient propeller. Select a hard block 8" x 1-1/2" x 1" for the prop. Drill the tiny hole for the propeller shaft, then cut the blank as indicated. A right-hand prop is carved; thin the blades as much as possible while still retaining the required strength. Cut the blades to a nice smooth shape—take your time and do a good job. The spinner is made by cementing small blocks to the sides of the hub; when dry they are cut to the desired shape. Several coats of light dope, if lightly sanded between coats, will give a smooth finish. Some kind of free-wheel gadget should be used to permit the prop to spin in the glide. Cement a washer to the back of the prop, too.

Covering

A neat, attractive covering job is a necessity for any fine flying scale model. Colored tissue is used and since this is a commercial plane, most any color combination will be correct. Our test model of the Cadet was colored red and blue with black trim. Every bit of the structure should be lightly but thoroughly sanded to properly prepare for a neat job. Cement cellophane side windows to place before starting to cover the fuselage. Bear in mind that only the longerons and stringers should touch the covering; the use of numerous small pieces of tissue on curved parts will help avoid wrinkles. Use only enough banana oil adhesive to stick the extremities of the area being covered and lap the individual pieces neatly. The balsa cowling and other similar parts are tissue-covered, too. Use several separate pieces of tissue on the wing tips, etc. Once covered, all parts are lightly sprayed with water to tighten the tissue. The tail surfaces and wing should be pinned to a flat surface to prevent warping. Clear dope is not applied to the covering until later.

Assembly

The various parts are now assembled. A half-windshield pattern is given on the plan; cut a complete paper pattern to make certain that it will fit your model before cutting one from celluloid. Avoid cement smears when attaching the windshield. Attach the stabilizer to its position on the top longerons. Off-set the rudder a bit to counteract prop torque; it should be perpendicular to the stabilizer. The balsa landing gear struts which were made previously should be attached. On the original model they were secured by covering both wire and wood with light silk which was then doped fast. Cover the struts with tissue to match the fuselage. The struts between the landing gear legs are made from rounded bamboo splints. Bearings should be cemented to the wheels so they will revolve smoothly. Color the wheels

Yes Sir!

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KIT E5014

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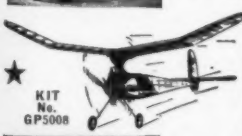

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★ SF KITS ★

Scale Flying SF Model Kits are, as the name implies, flying, authentic ¾" scale models of famous ships. All are now available in C-D COMPLETE (WET) KITS. They contain all parts including cements and dopes necessary in building these world famous model airplanes.

★ DWARF KITS ★

Dwarf kits are for authentic ½" scale models identical to the famed SF line except they contain everything necessary to complete building but colors. While we still honestly advertise these as dry kits they contain a tube of cement.

★ REP KITS ★

Cleveland "REP" Kits are all 20" Wing Span except the REP 5001 which is 27". Kits contain full sized detailed mechanical drawing, all wood printed out, finished scale wood wheels, turned cowl or drilled nose, finished balsa prop, strip Balsa cut to size, covering tissue, printed insignia and wing lettering cement, etc.

Kit No.		SF Wet Kits	Dwarf Dry Kits	EASY REP. Kits
1	Great Lakes Sport Trainer	$1.50	$.50	
8	Army Boeing P12-E	1.50	.60	
12	Bishop's Nieuport		.50	
13	Spad 13	1.50	.50	
14	Fokker Triplane		.50	
15	Fokker D-7 Fighter	1.95	.60	.25
19	Supermarine S6-B	1.75	.65	
20	Hawker Fury Fighter		.70	
21	Hawk P6-E Fighter	2.25	.85	.25
27	Doolittle's Gee-Bee	1.50	.50	
28	Monocoupe Sportplane		.50	
29	Boeing F4B-3 Fighter	1.50	.60	
35	Boeing 247 Transport		1.95*	
42	Howard "Ike"	.95	.25	
45	Martin Bomber		1.95*	
48	'34 Turner's W. Wm	1.75	.50	
49	Curtiss F11C-2	2.50	.85	
51	D. H. Comet Racer		.95	
52	"Mr. Mulligan"	$1.75	$.50	$.25
53	Grumman F2F-1 Fighter			.25
54	Hughes Racer			.50
55	Douglas Transport		2.50*	
57	Old Gr. Lakes Trainer 2TI-E			.25
58	Ryan ST			.25
59	Hawker Low Wing Fighter			.25
60	Boeing P26-A	2.25	.85	
61	Seversky Fighter	2.25	.85	
62	Custom Waco C6		.85	
63	'36 Caudron Racer	1.50	.50	
64	Beechcraft C-17-B		.85	
65	Lockheed Electra		1.95*	
66	Stinson Reliant			.25
67	Fairey Battle			.25
70	Al. Williams Gulfhawk			.50
71	'37 Folkert Racer	1.50	.50	
72	'38-'39 Turner-Laird	1.75	.50	
5001	Cleveland Amphibian			.25

*ALL KITS STARRED ARE COMPLETELY "WET" EVEN THO STILL IN THE DWARF LINE

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GP5006	40" PLAYBOY JR. Class "B"	2.50
GP5007	42" FLEETSTER Class "B"	2.50
GP5008	33" BABY PLAYBOY Class "A"	1.00
GP5016	33" ITSY BITSY Class "A"	1.00
GP5017	80" PLAYBOY SR. Class "C"	3.95
GP5020	48" VIKING Class "A" or "B"	1.50

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E5010	18" ARROW Class "B" Indoor	25c
E5011	20" JAVELIN Class "B" Outdoor	25c
E5014	36" THERMALIER Class "C" Stick	50c
E5015	45" WAKEFIELD "GULL"	$1.00
E5018	48" EAGLET Soaring Glider (Baby Bowlus Type)	50c
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13—RICK'S SPAD

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CONDENSER 20c

200 Volts O.I.M.F.D. capacity. Light metal clad unit with combination mounting and ground connection.

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The famous V, V-2 and V-3 plugs developed exclusively for high performance miniature motors.

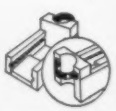
EXHAUST MANIFOLD

Easily attached to any Junior Motor, clip over exhaust ports. Keeps model free from oil, also excellent for cowling.

HIGH TENSION LEAD 15c

Finest stranded Belden Cord with high tension insulation and phosphorus bronze clips. Oil proof lacquered.

TEST BLOCK 35c



For running-in your motor, or for handy use when motor is not in model. Makes wiring and mounting simple, and protects motor from slip-shod clamping. Special features include metal strap for mounting coil, grooves for wire leads. Complete with crankcase screws and wiring diagram. Inside width 1⅛", outside width 2¼".

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Machined from High Grade Alloy Steel, free from flaw or defects. Balanced and Cadmium plated to prevent rust. Weights: 7 oz., 11 oz., 14 oz., & 6½ oz. (Brownie)

TIMER CAM 40c

Hardened coined steel Cam.

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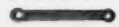

Drop forged one piece hy-grade special Alloy Steel.

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and tires. Wheels are held to place by a drop of solder at the end of the axles. Attach the wings. This will be an easy matter since the exact position and angle have already been determined. Tips should be elevated 1-3/8" to give the proper angle of dihedral. A coat of clear dope can now be brushed on the entire model. Do this job in a dry room to prevent "blushing"; exercise caution to avoid warping of the flying surfaces.

Addition of many of the more minor details will aid greatly in making the Cadet's appearance more snappy. License numbers, fuselage stripes and similar items are cut from contrasting tissue. Ailerons, elevators, rudder, a door, etc., are effectively represented by thin strips of black tissue. Full-size wing struts are shown in broken lines on the wing plan; they are 1/16" thick and they are of streamline cross-section. Struts, propeller and other exposed wood parts are color doped. Air intake openings in the cowl, exhausts, a tail wheel and many other details can be found on photos of the real ship; they can be added to the model without impairing the flight qualities.

The hole in the prop shaft through which the prop shaft passes should be fitted with washers at both sides to fix the line of thrust—about one degree of right thrust should prove advantageous. Bend the prop shaft from .034 music wire. The nose block, several washers and the propeller are slipped on in the order given. A loop at the end of the shaft provides a place to attach a mechanical winder.

About 10 strands (5 loops) of 1/8" brown rubber will be required for motive power. Measure the strands to the correct length and then attach them to the loop on the prop shaft. Drop the rubber through the fuselage and slip the bamboo pin through the fuselage so as to attach them in the rear.

Flying

One of the most important factors in obtaining excellent flights from any flying scale model is patience. A well-built model, if properly handled, will provide countless realistic flights with little or no damage to the plane itself. If the plans were closely followed, the model should balance and fly with but little adjustment. Add weight to the nose or tail, as the case may be, to make the Cadet glide well, and then adjust the thrust line to correct the power flight. A small sliver of wood between the nose block and fuselage, tilting the thrust line down at a slight angle, will eliminate a tendency to stall; while right or left thrust will make the model turn as desired. Use a mechanical winder for long flights. Stretch the rubber strands about 2-1/2 times normal length and store up power.

Our original model was well tested and proved to be a splendid flyer. When the motor is tightly wound, the little ship fairly jumps from the ground and makes a swift, spiraling climb towards the clouds. As the power diminishes, it settles into a shallow glide and descends in easy right circles. Because of its great stability, flights of considerable duration are possible.

Stop! Look!—And Learn A Lesson

(Continued from page 17)

Sold, cracked-up or flown out of sight when? How much time spent building the ship? How much did it cost? How about a photo and a three-view sketch for the log-book record?

So it goes. After a few months, you'll find accumulated data of much assistance in planning a new ship and a pleasant record to refer to long after the model is gone.

Take W. Hewitt Phillips, formerly of Belmont, Mass., and now a junior engineer at the government's N.A.C.A. laboratories at Langley Field, Va.

"Hew" won innumerable local prizes in Boston and national awards at the annual championship classics with his indoor and outdoor craft. Yet, gliders seemed to intrigue him most. Result was he always showed up at Jordan-Traveler Junior Aviation League meets in Boston with experimental indoor and outdoor gliders.

But Phillips was smart. No haphazard building for him—he hadn't time—he was attending Massachusetts Institute of Technology (we understand, incidentally, Art Beckington of Rockford, Ill.; Connie Hansen of Beloit, Wis., and Bill Mott of Staten Islyand, N.Y., have invaded that institution)—so Hew numbered all his gliders and kept tabs on their relative performances. Result was that by the time he'd built, numbered and flown glider No. 32, he could come fairly close to cracking national records whenever the opportunity and flying site presented themselves.

Another observant Bostonian was Bruno P. Marchi, now chairman of the Academy of Model Aeronautics' Contest Board. At meets, both home and afield, Marchi would gather up interesting-looking models which had been abandoned by their owners at end of meets, either in disgust or because ship had been wrecked. Back to his model lab Marchi would cart these broken fuselages, parts of wings, bits of rubber motors for a minute examination for type of construction and materials used, and where and why the wood, rubber or covering "gave."

At one time carefully stored away and catalogued, Marchi had hundreds of modelplane parts with almost every well known flyer represented in the collection. "Marchi's Museum," as it came to be known, provided many an absorbing evening to the "expert" modelers of his vicinity as they sat around discussing the design of a Goldberg prop, a Kittel motor stick, or a Cahill wing.

It was through such observant work as this that Marchi achieved considerable fame as an outstanding aeromodeler. And his model airplane work led him directly into aviation and an aeronautical engineering degree from Boston University.

So why not give more heed to your own efforts? As you fly your models don't jump up and down because of a good flight, or wail because of a poor one. Watch the model—every expert does. Is it stalling? How's the turn? Could that wing stand a bit more dihedral?

The old warning was "Stop, look, and

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1/8x3/16	12 for 5c
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1/4 sq.	6 for 5c
1/4x1/2	3 for 5c

18" Balsa Sheets

1/64x2	6 for 10c
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1/16x2	8 for 10c
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3/16x2	3 for 8c
1/4x2	3 for 9c
1/2x2	2 for 11c

3" & 36" cost twice 18":3x36, 3 times.

NOSE BLOCKS

1x2x1	1c
2x2x1	2c
2x2½x1	3c
3x3x1	5c ea.
3x3x2	7c
3x3x3	9c
5x5x2	17c

5 FOOT BALSA

1/8x3/16	12 20c
1/8x1/4	10 20c
3/16 sq.	8 20c
1/4 sq.	6 20c
1/4x1/2	3 20c
3/8 sq.	2 20c
1/2 sq.	2 29c

Sheets, 4 times 18". Double the above price for genuine aircraft SPRUCE

18" Balsa Planks

1/8x1/2	2 for 5c
1x1	1 for 5c
1x2	1 for 9c
2x2	1 for 16c
2x3	1 for 22c
2x6	1 for 48c
3x6	1 for 72c

Plastic Balsa

4 oz. 22c, 1 oz. 10c

PROP. BLOCKS

1/2x	3/4x	5 7—5c
1/2x	3/4x	6 6—5c
5/8x	1x	8 5—5c
3/4x11/4x10		2—5c
3/4x11/4x12		3c ea.
1x11/2x12		5c ea.
1x11/2x15		6c ea.

PLYWOOD

1/16, 1/8, 1/4 40c ft.

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No Premiums or Packing Charges on Motors—P.P. 15c

Ohlsson "18"	$14.50
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CLEAR DOPE THINNER
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Colored Dope
1 oz. 6c, 2 oz. 11c
1/2 pt. 35c, pt. 60c
MICROFILM
RUBBER LUBE
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LIQUID CELLULOID
1 oz. 9c 2 oz. 15c

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White, Red, Yellow, Orange, Blue
3 for 25c—"OO" —3c per sheet.
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All col.. doz. 19c
Silver, ea..... 4c
Superstik, wh. 5c
Bamboo Paper
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Trexler Wheels

1¼,	1½—40c
1¾,	2—50c
2¼,	2¾—60c
Gas Mod.	2¾—$1
3-1.25—	3½-1.50
4½-1.75	

M&M WHEELS

1¼,	1½, 1¾—50c
1¾,	2, 2¼—60c
Gas. Mod.	2¾—90c
New 3"	$1.00
3¼ 1.50,	3½ 2.75
4½ 2.75—6"	4.00

PROPELLERS

Balsa	Paulo	Ritz	Wisa Gas
5"	4c-	7c	Med.
6"	5c-	9c	9"35c
7"	6c-	12c	9"35c
8"	7c-	15c	10"35c
9"	8c-	19c	11"35c
10"	9c-	23c	12"35c
12"	10c-	28c	13"35c
14"	12c-	40c	14"35c
15"	15c-	50c	15"X
16"	16c-	X	16"50c
18"	25c-	X	18"75c

RITZ Gumwood

8"-9"-10"-11" 15c
12"-13"-14" .15c
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Alligator Clips—5c Solderless.....10c
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Nickel plated 50c. Streamlined $1.00
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3½ 1.50, 4½ 1.75
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Smith 3 V...$2.50
" —1½ V 3.00
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5/16, 8c 9/16 10c
11/16 12c per set

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Austin $1.00
Dural 1.97
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3 sheets 5c

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Write for WHOLESALE PRICE LIST

ALUM. TUB'G per ft.	BRASS TUB'G per ft.
1/16 .....6c	8c
3/32, 1/8 .....7c	10c
3/16 1/4 .....9c	12c

Sheet Alum—ft.
.003 10c .010 15c

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1/8x1/2	.15c ft.
3/4x3/4	.22c ft.

BOMBS

3/4" .....2 for 5c
1¼" ....2 for 11c
3" Torpedo 10c

Spray Guns
Small, 59c. Large Size, 2 jars, 97c

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Model Knife, Surgical Steel Blade 10c
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Insignia 36—American, French, English, German, Squadron, in colors, gummed, per sheet..... 5c
Washers, pinhole, 1/8, 1/4, 3 doz. 3c
Prop Shafts, doz sm. 6c, large....10c
Ball Bear: 1/16 15c ea., 1/8.....33c
Nose Plugs for 5c; 1/2"—8, 3/4"—6, 1" 4.

MUSIC WIRE

.014	6 ft. .2c
.020 .028	6 ft. .3c
.034 .040	6 ft. .6c
.049	6ft. .8c
1/16"	3 ft. 5c.
3/32"	5 ft. .15c
1/8"	5 ft. .20c

WHEELS per pr.

Bush	Wisa	A Colu	L
1/2	.01	.03	U
3/4	.02	.04	.05 M.
1	.03	.05	.07 .06
1¼	.04	.07	.10 .09
1½	.06	.10	.16 .12
2½		.12	
3		.15	.30

BROWN RUB'R

1/16 sq. 15 ft. 5c
3/32 flat 15 ft. 5c
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Skein 225 ft. 1/16 50c, 1/8—60c, 3/16—85c

Camel H'r Brush
Med. 8c, Lge. .8c
Small 3c.... Gas Mod. 15c

Thrust Bearings
1/2 doz. Sm. 5c
1/2 doz. Lge. 7c

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1½" 8c, 2" 12c
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listen—and you'll live to cross railroad tracks." We say, "Stop long enough to look, listen to what those more experienced than yourself have to suggest, and the life of your models will be a lot longer!"

Know Your War Planes by Their Insignia

(*Continued from page* 12)

Poland

The striking "blitzkrieg" attack upon Poland by the invading Nazis found a small but efficient air force fighting furiously against tremendous odds. Within eighteen days German bombers and mechanized units laid waste to all important Polish cities. What was left of the Polish air force fled to join the French air service where they continued to fight under their own colors until the capitulation of France itself.

The unusual design of the Polish insigne had no particular significance other than to provide visual effect at highest altitudes. The colors red and white are the colors of the Polish flag.

The aircraft insigne was established by a decree of the President of the Republic of Poland on March 1st, 1930. However, another source says that it was adopted in 1922 at the origin of the Polish air force. At present the remainder of the air service is actively engaged in England under the R.A.F. command. According to a recent statement from the Polish Embassy in Washington, the Polish Air Force *still* exists!

Romania

Cockade and rudder markings for the Romanian fighting aircraft were chosen by the Air Corps in the Spring of 1916. The colors are identical with the national flag, namely blue, yellow and red. Although the insigne was adapted early in 1916, Romania did not enter the war until August of that year. The markings of the present fighting planes are a carry-over from the first World War.

Turkey

Fighting planes of the Turkish Air Force, since its inception, have been identified by a simple red and white box design. This has no particular reference to the past, but merely chosen as a distinguishing mark. A more recent addition as the national identification mark painted on aircraft rudders is a crescent and star in white against a red background. This symbol is taken from the national ensign.

Greece

Peace and purity symbolize the Greek race, and as such these characteristics manifest themselves in the two colors chosen to identify their national aircraft markings. The typical tri-colored cockade and rudder stripes are recognized by the colors blue and white indicative of the aforementioned virtues.

Egypt

The symbol of Islam identifies the wing insigne of the Royal Egyptian Air Force. In 1922, when Egypt was declared a free, independent and sovereign state, a national flag having a white crescent and three stars on a green background was adopted. The wing markings, taken from the flag, bear the same colors. The colors typify Egypt's background, green representing the Valley of the Nile and the crescent as emblematic of Islam, Egypt being a Moslem country.

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Marvin is that kind of a motor. With a nation-wide reputation for ease of starting, brilliant performance, and rugged durability, the Marvin has become the sensation of the Class A's.

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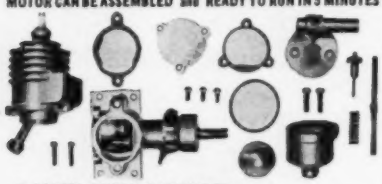
MOTOR CAN BE ASSEMBLED and READY TO RUN IN 5 MINUTES



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This motor is designed thruout to give the maximum performance. Test motor was run 200 hours continuously without changing anything but the spark plug.

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1/16x1/16 100, 5c
1/16x¼ 35 for 5c
1/16x3/16 18, 5c
1/16x½ 15 for 5c
3/32x3/32 30, 5c
⅛x⅛ 30 for 5c
⅛x3/16 12 for 5c
⅛x¼ 10 for 5c
3/16x3/16 8, 5c
¼x¼ 6 for 5c
⅜x⅛ 6 for 10c
⅜x1/16 5 for 5c
⅜x⅜.....each, 2c
½x⅛ 2 for 5c
1/64x2 4 for 10c
1/32x2 8 for 10c
1/16x2 8 for 10c
3/32x2 7 for 10c
⅛x2 6 for 10c
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3" sheets or 36" lengths, double above prices; 5 foot Balsa, triple 18" prices. Add 15c pckge. chge. for 36" lengths—20 for 5-foot lengths.

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3/32 8 for 10c
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18" PLANKS

1x1 5c; ⅛x2 6c
1x1½ 9c; 1x2 10c
1x3 15c; 2x2 18c
2x3 23c; 2x6 39c
3x3 40c; 3x6 75c

THRUST BEARINGS, dz. Sm. 10c; lge. 15c

WHEELS per pr.

Birch	Bliz	Celu
⅛	.01	.03
¼	.02	.04 .05
1	.03	.05 .07
1⅛	.04	.08 .10
1⅞	.07	.10 .16
3	.15	.15 .30

CLEARCEMENT

5c per oz.; large bottle, 8c; ½ pt. 35c; 1 pt. 55c

CLEAR DOPE OR THINNER

5c per oz.; Large bottle, 8c; ½ pt. 20c; 1 pt. 45c

PROPELLERS

Balsa	Paul-O-Mach. Cut	Wina
5"	4c	10c
6"	5c	15c
7"	6c	20c
8"	7c	25c
9"	8c	30c
10"	8c	35c
12"	10c	45c
14"	14c	
15"	15c	55c

RUBBER

.045 .....25 ft. 5c
1/16 sq.. 15 ft. 5c
⅛ flat .15 ft. 5c
Skein 55c
3/16 .....10 ft. 5c

11" BAMBOO

1/16x¼ 6 for 5c
Shredded 36—5c

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1/32-1/16 2 for 1c
3/32 or ⅛ 1 ft. 1c

COLORED DOPE

5c per ⅛ oz.; lge. bot., 10c; ¼ pt., 35c

SPONGE RUBBER WHEELS

pair 1" 15c
1¼" 18c

PNEUMATIC WHEELS

3½" pair.....95c

TISSUE, AA

All col., doz. 10c
Silver .....ea. 5c
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6x8 .....5c
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SHEET ALUM.

.0004x5x11½ 2 sheets 3c
.005 in....6x6...5c
.010 in....6x6...6c
1/32 .....6x6...15c
1/16 .....6x6...30c

WIRE

6-8-10-12-14 2 ft. 1c
1/16 dia. 5 ft. 12c
.050 3 ft. 5c
3/32 dia. 5 ft. 15c
⅛ dia. 5 ft. 25c

ALUM. TUBING

1/16,3/32,⅛,ft.7c
3/16, ¼, ft. 10c
5/16, ft. .15c

NOSE PLUGS

½" .....12 for 8c
Smith Coil $2.50
Toggle Switch .15
Booster Plug jacks, ea. 10c
Battery Boxes
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Penlite, 1¼" .50
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A-2-¼-32

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Bulgaria

The present insignia of the Bulgarian air service was adopted in compliance with the International Air Convention of December, 1919. It is circular in outline, having a red iron cross with swords of yellow contours superimposed upon a white field.

The insignia are carried on the wings and fuselage sides. The rudder markings are portioned off with three equal bands of white, green and red, these being the national colors. The red cross with swords has its origin in the Bulgarian Order of Valor created in 1879.

Spain

The fighting planes used by the insurgent forces under the rebel leader Francisco Franco, in the late Spanish civil war, were supplied by both Germany and Italy. Fiats, Capronis, Heinkles and Messerschmitts of latest design identified by the Rebel "X" marking on their wings and rudder fought against inferior equipment used by the hard-pressed Loyalists. Most of the latter's equipment, marked with broad red stripes across the wing surfaces and fuselage, were antiquated French Breguets. However, not until aid from the Soviet Air Force did the insurgents meet with any real aerial opposition. The Russians using their famous *Rata* low wing pursuits (modified copies of obsolete Boeing P-26) and the *Mosca* biplane (Curtiss Sparrowhawks) cleared the way for Loyalist bombers and fought off attackers while their slower escorts carried out reconnaissance flights.

Sweden

The marking for Swedish military aircraft is part of the Swedish state coat of arms adopted in the 15th century. The emblem was used on government aircraft as soon as ships were built in that country. The colors of the three crowns are yellow superimposed upon a blue circular field. The design and colors of the insignia are a "carry-over" from the shield of King Albrecht, (Albrecht von Mecklenberg) a German who became King of Sweden in 1346.

The Netherlands (Holland)

The late Netherlands Air Force craft were identified by markings whose colors were taken from the national flag. The symbol, divided in three equal parts and read in a clockwise direction, was painted red, white and blue. A small circle within the insignia is of an orange hue, that being the color of the Royal Family of the Netherlands.

Switzerland

The white cross insigne against the red background on Swiss military aircraft represents the Swiss flag. The Swiss cross is found on the wings and rudder surfaces. The cross marking traces its origin back to 700 years ago, though in 1848 a flag bearing this symbol was chosen as the Swiss national emblem.

United States Army Air Corps

The present alternately-striped insignia on U. S. Army Air Corps planes were approved on November 3rd, 1926. It was suggested by C. N. Montieth, a former World War pilot with the U. S. air service. The tri-colored rudder markings used previously, were similar in design to those used by several foreign governments.

The reason for the change lay in the desirability for a distinctive insignia for the air corps. The present rudder marking is considered especially appropriate in that it corresponds more nearly to our national flag design; the thirteen red and white stripes being symbolic of the original thirteen colonies.

Boldest of the markings on army aircraft is on the lower wing, visible from the ground when the plane is overhead. On the right wing, in plain block style 24 inches high are the letters "U.S." and on the left wing the word "ARMY" with the top of the letters toward the leading edge. National Guard airplanes marked, (Name of state) N.G. on lower wing.

Each airplane assigned to a permanent organization of the air corps carries the Organization or Squadron Insignia. No standard location is specified, but the preferred location is on the sides of the fuselage midway between the wings and tail surfaces where it can be recognized at a distance of at least 150 yards. Organization insignia usually depict some historical or geographical feature of the organization. Some examples are a falcon, an American Indian face in full headgear, a buffalo, Jiggs (the cartoon character), the Capitol Dome, etc.

New airplane's specific identification markings are found forward of the front cockpit on the left side. When the cockpit is in the nose, the marking is placed to the rear of the cockpit. Stenciled letters approximately an inch high read:

"U.S. ARMY (Model Designation) AIR CORPS SERIAL NO. ....., Crew..... Weight ..... lbs."

Ireland

At this writing Ireland is not involved in the second World War. Newspaper reports, however, have given accounts of several engagements in the air between German planes and the Irish Home Guard planes when the former violated Irish neutrality. Aircraft comprising the Irish Air Force are for the most part, British built.

The insignia for Ireland's small air force are taken from the colors of its national flag. The colors, green, white and orange arranged vertically have been used on the flag since its adoption in 1848.

Green represents the national color of the older and native population of Ireland, which is mostly Catholic. Orange signifies the element in the population which descended from the English and Scottish Protestant settlers who came to Ireland in the 17th century. The white in the flag symbolizes the truce between these two elements and as a whole, the unity of Ireland.

In the war of 1688-1691 the Protestants in Ireland mostly gave their allegiance to William of Orange, who came from Holland to become King of England as William the Third. In his honor the color orange was adopted by the large body of Irish Protestants, especially in the northeastern part of the country.

Although introduced in 1848, the flag was not generally adopted in Ireland until the Rebellion of 1916 when it was hoisted over the headquarters of the leader, Patric

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Operates upright or inverted. Chrome-vanadium steel cylinder honed and lapped to .0001". Timer enclosed. Crank case special aluminum alloy, permanently sealed. Extra long bronze bearing. Tungsten points. Bore and stroke, ¼". Disp. .199. Weight 3½ oz. Block tested.

$12.50 with coil and condenser

AeroChamp 95¢

E21 Gas Model (Kit only. Less Wheels & Prop.)

Designed especially to take the "199" motor shown here. A brand new type gas model, practical and easy to build. Small, light and sturdy for safe landings. Wing-span 46 in. Flying weight 16 oz.

Complete with "199" Motor, Megow Sponge Wheels, Rite-Pitch Propeller and Flight Timer. **$14.95**

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50" span model of popular in-line engine, tandem sport trainer used by U.S. Army. Complete with plans and materials.

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D11 AIRACOBRA

37" span model of 500-mile-per-hour interceptor pursuit plane. Tricycle landing gear, 3-blade semi-carved propeller, full-color insignia, colored dope, plans and all necessary materials.

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D10 GULFHAWK, JR.

17-in. model of Al Williams' latest. A Stinson 105. Colors orange and white. Complete with plans and all materials.

$1.50 *(By mail, post 15c ex.)*

J17 "STUKA" BOMBER

30-in. span rubber-powered model of the German Junkers Dive Bomber JU 87B. All materials and plans.

25c *(By mail, post. 10c ex.)*

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Pearse. From that time on, it definitely replaced the old national flag which had consisted of a golden harp on a green background.

Mexico

The Mexican aircraft insignia is also an adaptation of its national flag. The insignia design was adopted by Presidential Proclamation and has been in use since the beginning of military aviation in Mexico around 1918. The flag was adopted in 1821, its colors being green for independence, white for religion, and red for union. Green forms the outer border of the triangular wing insignia, and on the rudder, is nearest the fin.

Czechoslovakia

Prior to its absorption by Germany, the Czechoslovakian Air Force engaged in little activity against the Reich Air Force; most of which was pursuing enemy aircraft that violated her borders. In the Anshluss that followed, the whole air force was seized by the Germans, except a small number that were destroyed or flown to France.

The insigne, colored red, (shown darkest) white and blue is a copy of colors of the Czech banner which was adopted more than a thousand years ago. The design was chosen as a mark of easy recognition and had no particular significance.

U. S. Navy

The numerous individual squadrons of our U.S. Naval Air Service have, for the past several years, employed various colors on their tail surfaces to serve as a distinguishing mark for the respective units. Since this custom originated the familiar tri-colored vertical striped rudder more or less faded into obscurity. In many cases its use was dropped altogether. To date, however, only the U.S. Marine Corps planes use this marking.

In connection with the mission of the striped rudder, paragraph E-17b of Navy Specifications SR-2a, the following is quoted:

"In the case of carrier utility or staff planes and shore based planes, the use of vertical red, white and blue striping on the rudder is optional. In such case the surface of the rudder which is in the rear of the rudder post shall be divided into three equal parts and the colors applied with red at the trailing edge, white in the center and blue nearest the rudder hinge."

The coloring of Naval planes is considered very much a part of its national identification and all service craft are painted as follows:

Lower wings and under side of upper wing—aluminum. Top of upper wing—chrome yellow. Vertical stabilizer and underside of horizontal stabilizer—aluminum. Top of horizontal stabilizer—chrome yellow. Rudder, same as the fuselage. Fuselage, if fabric covered—aluminum. Fuselage, if metal—gray or natural finish.

Training planes—entirely chrome yellow.

The service insigne of a red circle inside a five-pointed white star, inside a circumscribed blue circle, is placed inboard from each wing tip on both the top surface of the upper wing and on the under surface of the lower wing. The center of the circle is located in from the wing tip, a distance equal to the chord length of the wing tip to which it is applied. The circumscribed circle is tangent to the forward edge of the aileron and to the leading edge of the wing. It does not exceed 60 inches in diameter.

The branch of the service—U.S. Navy or U.S. Marines—is painted with black on each side of the fuselage midway between the top and bottom longerons and parallel to the longitudinal axis of the airplane with the last letter approximately 12 inches from the rudder hinge. These markings were adopted and made compulsory in December 1923.

The empennage of naval planes on individual operating squadrons is painted in whole or any part of one of the following distinguishing colors.

Insignia red
White
True blue
Black
Willow green
Lemon yellow

Planes attached to squadrons are marked on each side of the fuselage with a series of three designating figures of an appropriate size as follows:

first figure—number of squadron
middle figure—class of squadron
last figure—number of airplane in squadron

Thus, 2-F-1 is the marking for number 1 plane in squadron VF-2 and 8-P-10 is number 10 plane of VP-8. The letter "V" is the Navy aircraft designation for heavier-than-air machines. These markings are placed forward of the service markings mentioned in the paragraph above and in such position that the centers of the two groups are on a horizontal axial plane. The individual squadron insigne is usually painted on each side of the fuselage forward of the designating markings.

Air Youth of America

(Continued from page 31)

Eighteen-months course in airline mechanics and operations. (tuition value $1080)

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The winner of this scholarship may select one of the following courses:

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Air Youth Contest Guide

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2x3, each	35c

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An Air Youth Handbook." This is the first book of its kind to give complete information on how to plan and conduct all types of model airplane contests, from informal demonstrations and games, to sanctioned meets. Included in the book are the complete rules for contests sanctioned by the N.A.A. through the Academy of Model Aeronautics.

Much invaluable material for contest directors and builders is included in the book, which has been developed under the direction of Arthur Vhay, technical director of Air Youth, and known to model builders everywhere as director of the Nationals for three years. In preparing the book, Vhay has had the assistance of such veterans as Irwin Polk, Bob Sommers, Harry Vogler and others. Of particular value are the standard contest forms included in the appendix, the fuselage cross section table, and the conversion table for decimal stop watches.

Club leaders will particularly find the book of interest because of the material which it contains suggesting games, demonstrations and exhibits which small clubs, and those just beginning model airplane activities, can undertake. The preface has been written by Winthrop Rockefeller, chairman of Air Youth.

School for Club Leaders

Following up the successful training school for leaders of model airplane clubs held this Fall by Air Youth, Art Vhay will conduct a second session of the school during January and February. Emphasis in the school, which will meet once a week, on Monday nights from seven thirty to nine, will be on building methods. Construction of all types of rubber and gasoline powered planes will be demonstrated. Various types of model engines will be demonstrated. A special workshop is being fitted up for the meeting of the group.

The winter session of this Air Youth school for club leaders will begin on Monday, January thirteenth, and meet weekly through February. Meetings will begin at the Air Youth headquarters, 30 Rockefeller Plaza, and adjourn to the workshop for building sessions. For further information get in touch directly with Art Vhay, at Air Youth headquarters.

Cutting Down the Drag

(Continued from page 13)

wings in place. Though the drag of the elastic by itself might be negligible, when it is placed next to the fuselage surface an appreciable increase of drag results, as will be seen in the test data which follows. A model designer is not much concerned with riveted construction, but the large increase in drag which is known to be caused by the rivet heads on an all-metal airplane is likewise attributable to this cause. For this reason, the most modern airplanes employ flush-riveted or spot-welded construction.

Little more can be said regarding drag in general terms; therefore, let us proceed to examine the test results. These are presented in the table of figure (3). In this list the resistance of the combination tested is given as a drag coefficient based on the maximum cross-sectional area of the fuselage . In order to obtain the actual drag in any given case, one may use the formula:

$$D = (.000132)\ C_d\ A\ V^2$$

where D is the drag in ounces, A the maximum fuselage cross section area in square inches, V the speed of flight in feet per second, and C_d the drag coefficient given in the table.

What we are most interested in, however, is a comparison of the various values. As a standard of comparison, we will take the drag of a well streamlined fuselage form of round cross-section. This particular shape, pictured in the table, is the one which was found to have the lowest drag of the various forms which were tested. Its drag coefficient is .198. Contrasted to this low value is that for a square fuselage with a windshield, which is all of 72% greater. Tests show that nearly all of this gain is attributable to the windshield, which causes a disturbance in the airflow. Obviously models intended for contest work should not make such a large sacrifice in efficiency for the sake of appearance.

Now going back to the round fuselage, we add a cylinder head entirely exposed above the former lines of the fuselage. The result is a 20% increase in drag. This is not too alarming, but it certainly indicates the desirability of a cowling to improve the streamlining. No doubt a motor completely exposed from the firewall forward, as is the practice on many models which are otherwise streamlined, would cause a much worse increase in drag. Not only does the flat firewall give a large amount of resistance, but the airflow is made turbulent over the entire fuselage by the rough projecting parts.

In order to determine the improvement possible by using a cowling, a hood was made which fitted over the cylinder head. This fairing had openings at the front and rear which were adequate for cooling the motor. The test showed a reduction in drag coefficient from .237 to .225. No doubt if the fuselage were designed to fair in smoothly with the cowling, instead of adding the cowling later as an afterthought, still greater improvement could be obtained. Moreover, it is well known from tests on full-sized airplanes that the resistance of a fuselage equipped

with a cowled motor always increases as more air is allowed to flow through the cowling.

Now for contest work, where only a twenty-second motor run is required: It should be possible to completely enclose the motor, thereby eliminating drag from the cooling air. If this was done, the cylinder could be so smoothly faired that the fuselage should give no more drag than the basic streamline form. Experiments have shown that a miniature gas motor will run for about a minute without overheating even when completely enclosed. If longer warming up runs than this are desired, the gas model builder could probably use his ingenuity to design a cowling which could be removed for testing the motor and slipped on for official flights.

Next we will turn to the subject which was mentioned previously; namely, the effect of holding wings on with an elastic band wrapped around the fuselage. For this test, a slightly poorer fuselage of round cross-section was used, which had a drag coefficient of .242. An ordinary elastic band, of approximately 1/16" square cross section, was slipped over the fuselage. When it was placed about 25% of the distance back from the nose, the drag coefficient jumped to .261, an increase of 8%, and when it was moved to a point 3" back from the nose, the value increased further to .269. This bears out the supposition that the more fuselage area is exposed to turbulent air, the greater will be the drag. While these increases in drag perhaps do not seem alarming, it must be remembered that many builders have labored for hours doping, polishing and rubbing down their fuselages to a mirror-like finish in order to get a gain in efficiency of the same order of magnitude. Obviously it is foolish to spend time polishing the surface of a fuselage if the airflow is to be broken up by an elastic band which holds the wings on. Some other method of wing attachment should be used on highly streamlined ships.

One of the most unavoidable sources of drag on a gas model is the landing gear. Though some builders endeavor to streamline their landing gear struts, the great majority of gas models have landing gears made from round music wire, about 1/8" in diameter, with no additional fairing. This practice is prevalent even when the rest of the model is built with greatest of attention to finish and lines. We expect, therefore, that the next test will come as a shock to the majority of gasoleers. The landing gear tried was of very simple design, as shown in the diagram. It was attached to the fuselage which was first mentioned in this article. As a result, the drag coefficient jumped from .198 to .458, in increase of over 230%! All this was with fairly thin wheels. In fact, further tests showed that airwheels gave only slightly more drag than thin ones, and that by far the greater part of the landing gear drag came from the struts, rather than the wheels.

The reason for this situation was mentioned before, and its cure is not hard to find. The struts should be enclosed in a streamlined fairing. A study of the tests reported in the first article of this series reveals that the drag reduction to be expected from this procedure is about three times as great as that which would result from using a round fuselage in place of one with a square cross section. Again we are forcibly reminded that streamlining is not a matter of looks but rather of careful attention to the details of areodynamics.

Although a large improvement may be made by better streamlining of conventional landing gears, the possibility of eliminating landing gear drag by completely retracting the landing gear must not be overlooked. Even if a perfectly streamlined landing gear, such as is typified by the design used on the Stinson "Reliant" or on Col. Roscoe Turner's "Meteor" racer, gives only one-quarter the drag of the typical unfaired gear, it

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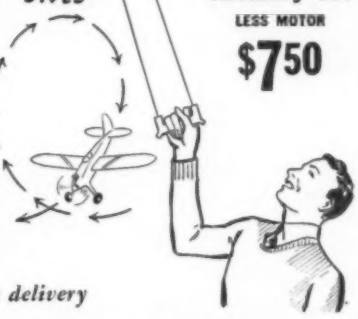

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1/16x3 ...20 .36
3/32x2 ...20 .21
3/32x3 ...20 .42
1/8x2 .....20 .23
1/8x3 .....20 .46
1/4x2 .....20 .42
1/4x3 .....20 .84
1/2x2 .....20 .75
1/2x3 .....10 .75

18" Plank Blasa
1x1½ ..each .05
1x2 .....each .08
1x3 .....each .10
1x6 .....each .18
2x2 .....each .13
2x3 .....each .18
2x4 .....each .23
2x6 .....each .30
3x3 .....each .40
3x6 .....each .70

BALSA PROPELLER BLOCKS
Per Dozen
1/2x3x3 05
1/2x3x5 05
1/2x3x6 05
3/4x1x7 14
3/4x1x8 18
3/4x11/8x10 25
3/4x11/4x12 30
1x11/2x12 38
1x11/2x15 48

BAMBOO
1/16 Sq. x12" Gr. 19
1/16x1/4x15" Dz. .....10 Gr. 80

REED
Diam.
1/16 60 ft.... .15
3/32 60 ft.... .18
1/8 60 ft..... .25

DOWEL
1/16 Diam. x 12" 2 Doz. .18
1/8 Diam. x 36" 1 Dz. 23
3/16 Diam. x 36" 1 Dz. .36

BALSA CARVED PROPS
5" .....Doz. .23
6" .....Doz. .33
7" .....Doz. .39

PAULOWNIA WOOD HANDCARVED STANDARD Props.
5" .....6 for .35
6" .....6 for .45
7" .....6 for .50
8" .....6 for .55
10" .....3 for .45
12" .....3 for .55
14" .....3 for .65
15" .....3 for .75

BALSA OR HARDWOOD WHEELS
1/4" .....Doz. .09
3/4" .....Doz. .11
1" .....Doz. .14
1 1/4" .....Doz. .19
1 3/4" .....Doz. .35
2" .....Doz. .43

RUBBER AIR WHEELS
No. 1....1¼" to 1¾"....Pr. .25
No. 2....1½" to 1¾"....Pr. .25
No. 3....1¾" to 1¾"....Pr. .32
No. 4....2" to 2¼"....Pr. .32
No. 5....2¼" to 2¾"....Pr. .38
No. 6....2¼" to 2¾"....Pr. .38

BALSA NOSE BLOCKS
1x2x3 6 for .12
1x3x3 6 for .18
2x2x2 6 for .15

HARDWOOD NOSE PLUGS
One Dozen.....07

COLORLESS CEMENT
½ oz. Bottles Doz. 28
½ oz. Tubes Doz. 35
1 oz. Bottles Doz. 35
2 oz. Bottles Doz. 60
2 oz. Tubes Doz. 75
3 oz. Bottles ½ Doz. 50
1 Quart 60
1 Gallon 1.50

CLEAR DOPE or TINNER
½ oz. Bottles Doz. 28
1 oz. Bottles Doz. 35
2 oz. Bottles Doz. 60
3 oz. Bottles ½ Doz. 50
1 Quart 60
1 Gallon 1.50

COLORED DOPE (all colors)
½ oz. Bottles Doz. 33
1 oz. Bottles Doz. 45

STANDARD GAS PROPS
8, 9, 10, 12, 14" 18

GAS MODEL WHEELS
No. 8-G-2¾" Diam. 60
No. 9-G-3" Diam. 75
No. 10-G-3½" Diam. 90
No. 11-G-4½" Diam. 1.05

2 oz. Bottles Doz. 65
3 oz. Bottles ½ Doz. 60
1 Quart 70
1 Gallon 2.25

BRUSHES
Regular Size 2 Doz. 70

SANDPAPER
6 assorted sheets to pkg. 12 pkgs. 34

FINE SILK TISSUE
20"x24"
White ....Doz. .12
Colors ....Doz. .15
Silver ....Doz. .36

RUBBER
225 Feet
1/32 Sq. 25
1/8 Flat. 50
3/16 Flat. 60
Per Pound—Any Size 1.25

WIRE
.014 100 Ft. .30
.016 100 Ft. .30
.020 100 Ft. .35
.028 100 Ft. .40
.034 100 Ft. .40

BENT WIRE PROP SHAFTS
Dozen 10
Gross 75

ALUMINUM TUBING
O.D.
1/16" ..6 Ft. .25
3/32" ..6 Ft. .32
1/8" ..6 Ft. .32
3/16" ..6 Ft. .43
1/4" ..6 Ft. .50

12" WIDE SHEET ALUMINUM
.003 ....2 Ft. .20
.005 ....2 Ft. .24
.010 ....2 Ft. .31

CELLULOID WHEELS
3/4" ....12 for .25
1" ....12 for .28
1¼" ....12 for .30
1¾" ....12 for .45

SHEET CELLULOID
12½"x16" 19

BUSHINGS
Small ....100 .15
Medium ...100 .20
Large ....100 .25

THRUST BEARINGS
Small ....Doz. .06 Gross .60
Large ....Doz. .07 Gross .75

SPRAYER
Per Dozen.....40

MODEL PINS
12 Packages .35

WASHERS
1/8" 100 for .08
1/4" 100 for .10

TRU-CUT BALSA KNIVES
Per Dozen.....75
Extra Blades 3 Doz. 80

GAS MODEL PARTS

BALSA STRIPS, 3 Ft. Lengths
1/8x1/8 .....25 .14
1/8x1/4 .....25 .25
1/8x1/2 .....25 .41
3/16x3/16 .....25 .35
3/16x1/2 .....25 .70
3/16x1 .....25 1.20
1/4x1/4 .....25 .72
1/4x1/2 .....25 1.00
1/4x1 .....25 1.25
3/8x3/8 .....25 1.25
3/8x1/2 .....25 1.35
1/8x1 .....25 2.00
1x1 .....10 1.15

3 FOOT SHEET BALSA
1/16x2 ....10 .40
1/16x3 ....10 .80
3/32x2 ....10 .60
3/32x3 ....10 1.20
1/8x2 .....10 .80
1/8x3 .....10 1.60
3/16x2 ....10 .90
3/16x3 ....10 1.70
1/4x2 .....10 1.00
1/4x3 .....10 1.90
1/2x2 .....10 1.40
1/2x3 .....10 2.00

LIQUIDS
1 Pt. Cement .30
1 Pt. Clear Dope 30
1 Pt. Colored Dope 40
1 Pt. Thinner .30
Qt. Cement .60
1 Qt. Clear Dope 60
1 Qt. Colored Dope 70
Silk, Per Yd. 30

SUPER GAS PROPS
8, 9, 10, 11" 24
12, 13, 14" 30
15, 16" 36
19" 60

IGNITION COILS AND TIMERS
Ignition Coil for All motors 1.75
Super-Lite Coil 1.45
Tiny Coil 2.25
High Tension Coil 10
Flight Timer...75

BATTERIES
Small 35
Regular 50

BATTERY BOXES
Penlight Battery Box 25
1" dia. Battery Box 28
1¼" dia. Battery Box 30

SPARK PLUGS
ALL SIZES 50

WIRE
1/16" dia. 24 ft. 25
3/32" dia. 25 ft. 30
1/4" diam. 25 ft. 85

BAMBOO PAPER
All colors, doz. 50

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1. No wholesale order for less than $3.00 can be accepted. 2. Add 10% of total order for postage. We reserve the right to credit amount included for postage, and to ship express collect when that amount is insufficient. We recommend express collect shipments. 3. Remit with order by money order or check. Cash mailed at your own risk. 4. Send 25% deposit on C.O.D. orders. 5. All our materials and kits guaranteed.

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still has about half the resistance of our well-shaped fuselage form. Perhaps the greatest improvement in the efficiency of full-sized planes in recent years has come about through landing gear retraction, and a similar improvement is possible on gas models. Of course, the advantages of a retracting gear are offset by its increased weight and by the danger of breaking the propeller each time the model lands. The ideal mechanism would seem to be one which could be locked in place for test flights but allowed to retract on official flights at contests.

Finally we must consider the drag of a stopped propeller, because this piece of equipment pulls the gas model along for only twenty seconds of each flight and tries to hold it back all the time it is riding the thermals. On outdoor rubber-powered models, of course, the propeller is so big that the plane will not glide at all if it is held fixed. Therefore free-wheeling or folding propellers are absolutely necessary. On gas models the propeller is much smaller and no one has ever worried much about its effect on drag. Our test result shows, however, that the propeller is by far the largest drag contributor which we have studied. It gives three times as much drag as the fuselage! Thus our combination of the streamlined fuselage and propeller has a drag coefficient of .755, compared to .198 for the fuselage alone. In this test, the propeller diameter was one-third of the fuselage length, which conforms to standard gas model practice, at least for the smaller models.

Here we have a really serious situation. There are several steps which could be taken to improve it somewhat. On a model which is expected to spend most of its flight gliding, the propeller blades should be made as narrow as possible, even at the sacrifice of a certain amount of efficiency in the climb. This is especially true of the portion of the blades near the hub, for only the tips are really effective in giving thrust. Also, a spinner over the hub should help the fuselage streamlining. However, it is obvious that the only way to really overcome this tremendous source of drag is to use a propeller with folding or feathering blades. Free-wheeling is not recommended, for a propeller whose blade angle is as low as is ordinarily used for gas models gives more drag when free-wheeling than when locked.

The problem of designing a propeller hub with provision for folding blades should be an interesting challenge to the model builder's ingenuity, for here is a chance to really make something better than the competitors possess. The hinges at the hub of the blade would have to be very strong, because a half-ounce propeller blade revolving at 6000 R.P.M. experiences a centrifugal force of about 128 pounds. Some difficulty might be experienced in spinning the propeller to start the motor, but no doubt this could be overcome by using some auxiliary starting device. Incidentally, it might be pointed out that a propeller with folding blades would have the practical advantage of avoiding breakage in landing.

In conclusion, let us put the landing gear, motor and propeller on our fuselage all at once. The drag coefficient reaches the tremendous value of 1.034. When these items are used on the square fuselage with the windshield, the drag coefficient is 1.261. This is six and one-half times as great as the drag of the ideal fuselage form! Incidentally, it was noted that the drag of the cylinder head could be eliminated by stopping the propeller in a vertical position, so that it shielded the cylinder.

The result of these tests is a proof of the fact that streamlining really does pay. It shows more than this, however: It shows that for streamlining to be worthwhile, it is necessary to do a really thorough job. Practically nothing is gained by making a beautifully smooth monocoque fuselage unless the motor is cowled, the landing gear faired and all unnecessary projecting parts studiously avoided. It is these small things which give the major portion of the fuselage resistance. Hope these suggestions help!

Frontiers of Aviation

(Continued from page 27)

riety" that is now very much needed in the navy flyingboat industry.

While Glenn L. Martin lays the keel for its new six-engined naval flyingboat, the smaller twin-engined Martin patrol bombers are now in the fast progress stage after a much-too-long wait. Martin's new bomber for Great Britain is rolling off the production line, too.

Another mean piece of dynamite is North American's new NA-73 interceptor-pursuit. We passed by the North American plant the other day, just in time to see them give the NA-73's Allison one of its first warm-ups prior to taking off on its first test hop. Sitting out on the ramp in the rear of plant, and incidentally alongside the company's other new pursuit, the NA-68, the airplane's aluminum, flush-riveted skin sparkeled in the sunshine. Though of low-wing design, the wing is very close to the thrust line with the pilot sitting low in a well-designed enclosure which gives the ship a more wicked appearance than the British Spitfires. From the spectator's point of view it appears as though it will also have all of the Spitfire's speed and more to boot. Its long, pencil-shaped fuselage has, enclosed in the aft end of its belly, retractable inlet and outlet scoops for oil and prestone cooling, the design and principle of which is one of the NA-73's radical features. Unless the English anti-aircraft gunners are warned they will be shooting the plane down as a Messerschmidt, for it very closely resembles the Bf-109 when in the air. Its Allison engine is of the V-12, 1090 hp. type.

The NA-68 has completed test flights and though not in the high-powered category of the NA-73 it is a splendid little fighter. It was built to see service in the Orient and closely resembles the NA-50 in many respects.

Republic's interceptor-pursuit, the new YP-43, which has been a long time in the making since the original experimental ship flew, is now being delivered to the army air corps. It is of the same general design as the former Seversky models with

a large radial air-cooled engine turning a three-bladed propeller. The landing gear retracts inwards and is flush with the bottom of the low-wing. Much care was taken in the construction, especially in the finishing of the outside surface which is about as good a job as could be done on any all-metal airplane. The pilot enclosure has been redesigned somewhat to add to the clean lines of the high-speed airplane. The important feature of this airplane, however, as mentioned previously in descriptions of this plane in MODEL AIRPLANE NEWS, is the power plant installation with its supercharger for high-altitude flying. Just a small number of these planes have been ordered by the air corps for service tests at altitudes much above 20,000 feet, simulating operations against sub-stratosphere bombers. Republic has named the YP-43 the "Lancer" which will be used in its sales talk to foreign governments. The next pursuit of Republic's will be the P-44 which may be powered by either an Allison or an air-cooled, radial engine.

Great Britain is said to be doing all right with new interceptors also. We never were able to get any official confirmation on just what the popularized "Night Hawk" fighters were that the papers wrote reams and reams about, or if there was actually such an airplane. However, we have received some interesting news from one of our readers that Hawker is developing an interceptor-pursuit known as the "Tornado" and will be powered by a 2,000 hp. engine. (It is doubtful if this has any connection with Wright's new 2,300 hp. "Tornado" engine that will soon join Wright's stormy line-up.) It is destined to do 420 m.p.h.! Hawker has certainly proved their ability in the evolution of the Hurricane. Hawker always did build fine airplanes. Yes, we will admit it . . . . and we like the Spitfires, too. Our correspondent also writes us that Westland is producing a "Whirlwind" with a speed of 375 m.p.h.; Avro, a 15-ton bomber known as the "Manchester"; and Short, a new four-engined flyingboat to be known as the "Sterling." If the Manchester has any of the earmarks of the Avro Anson we will just skip the matter, but the Sterling should be a very promising airplane. Of course, what "makes" these airplanes is the institution of new powerplants of advanced design, and our correspondent says that Rolls-Royce has three new ones—the Sabre and Vulture of 2,000 hp. each and the Griffin of 1,000 hp. Liquid cooling is employed in all three.

Among the American types now seeing service in Great Britain are the North American Harvards and Yales, the Lockheed Hudsons, Brewster Buffalos, Douglas Bostons, Martin Baltimores and Curtiss Hawks, Helldivers and Northrop A-17s, not yet named at this writing. Canada also has some Douglas B-18A bombers. The Buffalo was originally ordered by Belgium and is the little single-seat mid-wing fighter. The present ship now used in Great Britain is of much lower power than those to follow on a new order. The Boston in this country is known as DB-7 Douglas and one in picturesque camouflage is now undergoing tests along with Douglas's new A-20 attack, which, incidentally, is also done up in war-paint. The Martin

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Here's the finest, most powerful class "A" motor you can buy! The new Elf "Twin" was designed for championship performance by experienced model builders. Its super, surging power won 7 out of 8 meets in the Pacific Northwest flying big, 5-foot (29 to 35 oz.) planes. Four meets were won with single flights!

The new Elf "Twin" offers a challenge to every model builder because it will revolutionize model plane design. No one to date has been able to fly the "Twin" in a "class A" (16 to 20 oz.) plane with the *motor wide open.* Think what this tremendous power would add to the performance of your ship! Be the first in your territory to set new records with the Elf "Twin".

7 TIMES A WINNER!

Look at this record

FIRST PLACES

14 min., 35 sec. (1 flight) Spokane, Wash., May 26, Carl Van Court, (5-ft., 29 oz. Zipper type).
9 min., Ritzville, Wash., June 27, Carl Van Court (1 flight won class "A" and Grand Prize).
12 min., 58 sec. Portland, Ore., July 14, Carl Van Court.
17 min., 7 sec. Sunnyside, Wash., July 28, Carl Van Court (1 flight won class "A" and Grand Prize).
14 min., 8 sec. Olympia, Wash., Aug. 18, Carl Van Court (1 flight won class "A" and Grand Prize).
11 min., 30 sec. Albany, Ore., July 21, Fred Burkhardt (5-ft., 35 oz. Zipper type) (1 flight won class "A" and Grand Prize).
8 min., Walla Walla, Wash., Aug. 25, Glenn Crisp (5-ft., 32 oz. Zipper type).

SPECIAL FEATURES OF THE ELF "TWIN"

Twin cylinder power and smoothness, cool running and fast starting, 12-ball thrust bearing, Elf "No-Drag" timer, transparent tank, air filter on the intake, total displacement .198 cu. inches, weight only 5¾ ozs.

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complete with mounting brackets, Elf "Twin" coil, and condenser.

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See page 7

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The lowest complete gas combination in model history. Both are complete including motor, model, timer-wheels, prop, etc. NOTHING ELSE TO BUY—JUST BUILD AND FLY. $6.95 complete.

1—SYNCRO MOTOR KIT COMPLETE WITH COIL AND CONDENSER
2—MERCURY "BULLET" GAS MODEL
3—GAS PROP
4—HYDRAULIC FLIGHT TIMER
5—BOOKLET ON MOTOR REPAIRS

48" Wingspan, 14 oz. Weight (with wheels and prop)
Climbs like a sky-rocket. A thermal catcher if there ever was one. Designed for small bore engines. Kit is complete with alum. Cowled nose, Wire, Cement, Dope, Celluloid, Tissue, Balsa strips, cut to size, full size plans and printed sheets, etc. Price of kit, if bought separate.....$1.50 P.P.

$3.95 for motor kit alone. $4.95 with coil and condenser.

DE LUXE COMBINATION—10 BIG ITEMS

1—SYNCRO B30 GAS MOTOR ASSEMBLED READY TO RUN ($6.95 alone)
2—MERCURY "BULLET" GAS MODEL
3—AIR WHEELS
4—VARNISHED GAS PROP.
5—HYDRAULIC FLIGHT TIMER
6—ELECTRIC SOLDERING IRON AC or DC
7—3 GASMOTOR WRENCHES (in leather case)
8—MAGNETIC INSULATED SCREWDRIVER
9—BOTTLE OF 70 S.E.A. OIL
10—BOOKLET ON MOTOR REPAIRS

$10.00 P.P.

TRADE IN your old motor! We will allow you $1.50 no matter what condition or make. Include all parts. Send $8.50 and that old motor for this complete gas outfit!

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Baltimore is a new version of the twin-engined light-bombers that were earlier delivered to France. Whether these new planes will ever be in the spotlight they deserve or forever be hidden in secrecy is problematical; those that are connected with their future are wondering whether they should be thoroughly publicized, such as propaganda to scare off the enemy, or whether they should just let the American public know that they exist and then try . . . . just try . . . . and keep the details secret. It is something like trying to make a big noise by whispering. But discussions on that topic have been going on for almost a century with no final settling of the question in sight for at least another hundred years. The government has been very liberal, however, in disclosing details of new aircraft orders. Below is tabulated recent army and navy airplane orders: (They are tabulated in the order the contracts were placed, the first being on July 19 and the last on October 5 for airplanes).

ARMY

Quantity	Type	Contractor	Amount
33	AT-8	Cessna	$ 900,378
1	XR-1 (gyroplane)	Platt-LePage	
637	AT-6A	North American	11,335,631
67	AT-7	Beech	3,410,746
100	PT-19A	Fairchild	1,038,300
56	B-24D	Consolidated	14,861,342
75	PT-13B	Stearman	2,041,947
225	PT-17	Stearman	
6	O-54	Stinson	
200	PT-20A	Ryan	2,074,234
500	BT-13A	Vultee	7,438,782
150	AT-7A	Beech	4,847,217
20	C-45A	Beech	
277	B-17E	Boeing	70,449,955
410	P-38E	Lockheed	30,278,787
120	P-	Bell	4,962,270
46	C-	Curtiss-Wright	12,410,116
150		Curtiss-Wright	4,221,069
540	P-	Curtiss-Wright	19,688,287
1000	P-	Republic	56,499,924
550	P-	Bell	19,896,668
	B-	Martin	14,269,646
	PT-	Stearman	6,934,096
	B-	Boeing	59,762,850
	P-	Lockheed	15,646,450
	C-	Douglas	20,229,184
	AT-	Beech	13,115,138
	B-	Consolidated	85,800,000
	PT-	Fairchild	6,672,200
	PT-	Ryan	5,255,087
	P-	Curtiss-Wright	48,514,819
	C-	Curtis-Wright	45,646,882
800	B-25C	North American	72,857,049
1100	B-26	Martin	99,641,880
	C-	Douglas	37,462,121
	A-	Douglas	141,320,610
	AT-	North American	37,770,981

NAVY (most orders placed during summer)

5	Utility Transport	Beech	$ 258,221
500	Primary Trainers	Naval Aircraft Factory	
25	SNJ-2	North American	458,104
600	Primary Trainer	Stearman	3,779,628
201	Primary Trainer	Spartan	1,859,880
243	Fighter	Grumman	7,260,280
1	Patrol Bomber	Boeing	
10	Utility Transport	Grumman	
1	Personnel Transport	Lockheed	117,668

Legend: B-Bomber, P-Pursuit, PT-Primary Trainer, O-Observation, BT-Basic Trainer, AT-Advanced Trainer, C-Cargo, R-Rotating Wing, SNJ-North American Scout Trainer. Blank spaces have been left where figures have not as yet been disclosed which may be filled in later. Several more large orders have been contracted for by the navy, though they have not been announced, and there have been small miscellaneous orders for parts, etc. not mentioned here.

A few notes on the planes mentioned: The XR-1 marks the air corps' first gyroplane. For several years the navy has been experimenting with that type of heavier-than-air craft, but the day is yet to come when they will go into quantity production. Several eastern companies have been experimenting with gyroplanes, such as Vought-Sikorsky and deBothezat. Pitcairn has put its small autogiro through some more tests, but as far as the air corps is concerned it will try the gyroplane before doing any more experimenting with autogiros. Rotating wing aircraft also received a set-back when Eastern Airlines was recently refused permission by the government to launch another autogiro mail service. On the west coast the only gyroplane experimenter, Ira Marriage, had some bad luck in testing his new creation described in past issues of MODEL AIRPLANE NEWS. The Hisso engine used during recent tests was not powerful enough to raise the entire gyroplane. A set of rotors is employed at each end of the fuselage. However, by rotating one set, one end of the craft could be lifted off the ground . . . this was proven. But . . . when the end came back to earth the ship laid over on its side, and both rotors were severely damaged. Thus another long wait before further tests. Besides getting one of its ends up in the air, this gyroplane actually knocked shingles off the workshop roof, sheared limbs off a tree and did other varied damage to the inventor's back yard before the disturbance was conquered. Advice to observers of gyroplane test flights: Run, do not walk to the nearest manhole.

North American completed their contract so soon after it was placed for large numbers of the AT-6 that the air corps has, altogether, given North American orders for about 2,000 AT-6A planes. The first of these has already been test-flown and delivered to the air corps!

All six of the Stinson O-54 observation planes have been delivered to the Air Corps. These are a development of the famous 105 sportplane and will undergo service tests for liaison work with the

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SIZES 1¼—1⅜—1½—1⅝"—PRICE $0.50 Per Pair, Postpaid.
SIZES 1⅞—2—2⅛—2¼—2⅜—2½—2⅝"—and Special Designed DoNut Wheels.
Size 1¾"—PRICE $0.60 PER PAIR, POSTPAID. For Air Mail Add 11c.

M & M 3¼" Gas Wheels $1.50 P. P. For Air Mail Add 21c

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Indeed an engineering triumph—accomplished by outstanding G.H.Q. designers and engineers, who have constructed into the G.H.Q. motor everything that years of exhaustive scientific aerodynamic research could produce—geared to the highest possible degree of perfection. But more than that, the acid test . . . an overwhelming response. Thousands of users in all parts of the country are praising, recommending, and endorsing this scientific achievement. It seems as if everyone in America wants one. The most hair-raising thrill you've ever experienced will be yours with the G.H.Q. motor—actually one of the most powerful motors ever constructed. Has broken records for amazing performance.

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EXACTLY THE SAME PARTS THAT GO INTO THE G.H.Q. ASSEMBLED ENGINE.

30 MINUTES TO ASSEMBLE

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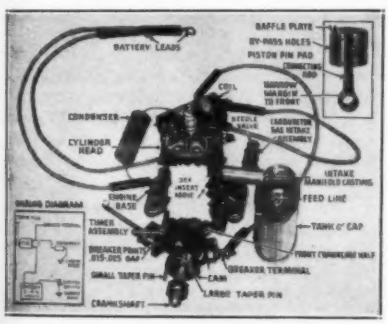
Imagine operating your own G.H.Q. ⅛ Horse Power gasoline engine—small enough to fit in the palm of your hand—yet turning up over 7000 revolutions per minute and powerful enough to fly model airplanes of from 4 to 10 foot wingspan, and propel model boats from one to six feet in length and midget cars that travel over fifty miles an hour!! There are also hundreds of other ways you can enjoy using this miniature yet powerful power plant—for small pumps, generators, compressors, blowers, fans, grinders and countless other experimental purposes.

Your G.H.Q. gasoline engine will be far more than just a toy for your spare moments. It is a scientifically constructed mechanical marvel that will thrill you with thousands of hours of pleasure. You will get a real kick out of controlling with your finger tip the surge of power your engine develops.

This engine has been tested and proven over the last seven years. Over thirty-five thousand of these powerful little G.H.Q. engines are now in actual daily use. Why not join the ranks of these hobbyists?



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Your engine comes to you with every part completely finished. Our factory-trained skilled mechanics, using the latest automatic precision machinery, have finished each and every part to the last detail. You merely assemble the parts in accordance with the few simple instructions given, using only an ordinary screwdriver, and inside of thirty minutes, your engine is ready to operate.

Not only will you and your friends have the thrill of seeing an engine ASSEMBLED BY YOURSELF operating, but you will gain a knowledge of gasoline engine theory and practice that will be a real practical value to you.

SPECIFICATIONS

4 Port 2 Stroke Cycle. ¾" Stroke. 15/16" Bore. 300-7,000 R.P.M. Bearing Surface, 1¼" Long. Crankshaft, 5/16" Diam. Rotation, Either Direction. May be run inverted. 1/5 Horsepower. Class C under NAA Rules.

G. H. Q.'s SEVENTH YEAR!

Thousands of Satisfied Users! Read some of these testimonials on file with us:

J. B., Providence, R.I.—"A few weeks ago I received the G.H.Q. motor kit and it is running perfectly. I hope to write you soon and tell you about some excellent flights."

R. H., Prairie du Chien, Wis.—"Your motors sure can take a lot of abuse and knocking around and yet perform perfectly. I have had two in a period of about two years and have seen higher priced motors give less service and performance."

W. W. W., Russellville, Ark.—"I received my G.H.Q. Motor Kit and am very well pleased. I had motor together in 1 hr. 40 min. I will place order next week for G.H.Q. Sporster Kit."

W. L., Claysburg, Penn.—"A wonderful motor that thrills any air-minded person. Strong and neat looking. As good as motors costing twice as much."

A. K., Hillside, N.J.—"I still can't understand how you can put such a dependable and rugged engine on the market at such a low price."

E. T., Sayville, N.Y.—"Received my G.H.Q. Kit okay and am more than delighted with same. You've got 'em all beat for price and performance."

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NEW FEATURES:

Lightweight 3-Volt Spark Coil; Chrome-steel, one-piece, drop forged counter-balanced crankshaft; 1¼" Bronze Bearing; Uniflow Steel Piston giving extra-high compression; Champion Spark Plug.

THE G. H. Q. GAS ENGINE CAN BE USED IN BOATS, MIDGET CARS & PLANES WITHOUT ANY CHANGES

The G.H.Q. Gas Engine sold five years ago for $35. Over 7000 were sold at $8.50. Today, you can secure a vastly improved engine kit for only $4.95 or factory-assembled for only $6.50. How is this possible? Simply because we have invested thousands of dollars in tools, jigs, dies and equipment to produce the only mass-production motor in the market. All parts are uniformly perfect.

1940 SALES OF G. H. Q. ENGINES AND KITS TOTALED 15,000

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Get your share of G.H.Q. business! Write for new Discount Schedule.

This identical G.H.Q. Gasoline Engine Kit is also available in factory assembled, fully bench tested and ready-to-run form.

This comes to you already tuned up . . . ready to mount and run.

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MANUFACTURERS OF

Miniature Gasoline Engines and Model Airplanes

40M EAST 21st STREET, NEW YORK, N.Y.

ORDER TODAY — 24 HOUR SERVICE

BUD WARREN Says:

Bud Warren points out new Tom Thumb motor construction features.

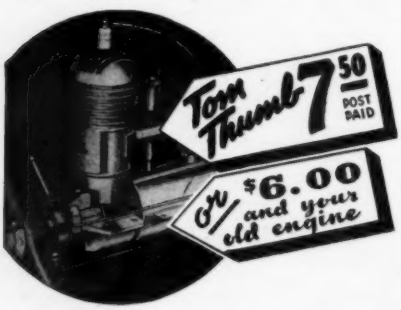
"I'VE got big news to announce! Tom Thumb motors now leaving my shop have new improvements that "hit the jackpot for performance."

"Every Tom Thumb now has a higher compression ratio and is equipped with a new steel piston which I lap into each cylinder for perfect fit. Of course this new "stepped-up" Tom Thumb is also fitted with piston rings to give the long life performance Tom Thumb owners have a right to expect."

"You can be running one of these new Tom Thumb motors in less than a week by sending your order today."

SPECIFICATIONS and HOW to BUY the NEW TOM THUMB

The Tom Thumb is the most powerful easy starting 1/5 H.P. engine made. Clip the coupon below, enclose money order for $7.50 (also your old motor for special $6.00 offer), and receive a *brand new* assembled and block tested Tom Thumb. Complete with fuel tank, coil, Champion spark plug, one piece cylinder and head and other modern features. Complete flying weight 10 oz. (less batteries). Bore 7/8"; Stroke 3/4".



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412 Brett St. Inglewood, Calif.

☐ Rush me one new Tom Thumb Engine. I enclose $7.50.

☐ Rush me one new Tom Thumb Engine. I enclose $6.00 and my old engine (any make) including all parts regardless of condition.

I intend to run my Tom Thumb— ☐ Upright ☐ Inverted

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Street .....

City ..... *State* .....

troops. 80 hp. four-cylinder Continental engines were installed. These ships will act as a sort of "seeing-eye" for the armored tanks and other mechanized forces. Radio is their main piece of equipment.

Beech's C-45A transports will be employed for carrying high ranking officers and the like about the country, but Curtiss-Wright and Douglas's larger transports will be used for carrying huge cargos of supplies and equipment and may also be used for carrying parachute troops.

In the pursuit category we will most likely see new designations, of which will be Republic's P-44 and North American's YP-50. Lockheed's P-38E will be a two-seater. As prophesied last month, North American and Martin are still battling it out neck-and-neck for the medium-bomber business.

In the meantime the British keep buying more airplanes, mostly increases to present orders as there is no word of any new equipment, except the NA-73, being developed for Britain. And here are more details on Douglas's new DC-6, the only peaceful airplane in our write-up this month:

DC-6: Passengers: 24-32 day, 16 night; Powerplant: Wright Double-Row Cyclone R-2600; Top Speed: 274 m.p.h.; Cruising speed: 246 m.p.h.; Landing speed: 75 m.p.h.; Service Ceiling: 28,000 ft.; Range: 1,784 miles; Span: 92 ft.; Length: 72 ft. 10 in.; Height: 27 ft.; Wing Area: 993 sq. ft.; Gross Weight: 33,500 lb.; Wing Loading: 32.2 lb./sq. ft.; Power Loading: 9.4 lb./hp.

It may be noted that this airplane has a wing loading of about 10 pounds more than the DC-3 though it is no larger, which is significant of the fact that the design of transport planes has increased tremendously in the past year. This also backs up our claims that wing loadings will practically be doubled in the next few years. The DC-6 will be similar to the DC-3 except that it will have a nose wheel and a "cleaned up" tail similar to the DC-5.

Powerful new Douglas attack-bombers, originally ordered by the government of Norway, are now being delivered—in Canada.

This was disclosed today by officials of Douglas Aircraft Company, who announced the first three 8A-5s in an order for 36 are in flight to Toronto for delivery to Norwegian military units. The attack-bombers were built in the company's El Segundo, Calif., plant, with deliveries scheduled for completion before close of the year.

While Douglas officials were frank to admit the new airplanes are being flown to Toronto, Norwegian representatives would not elaborate on this statement, nor discuss their plans for putting the ships into service.

As they roll off production lines the airplanes are inspected and tested by Commdr-Kristian Ostby, head of a Royal Norwegian military mission to this country. When their nation was overwhelmed, the members of the group escaped by daring stratagems, one officer capturing and flying to England a German seaplane.

Here with Commander Ostby are, Lieutenants Arve Aas, Odd Schyberg, Ludvig Brannvoll and Kaare Kjos; Engineers Einar Hvam, Harald Sundt and Reidar Halvorsen; Technicians Helge Torgersen and Erling Drangsholt.

Export version of Douglas attack-bombers now in use by United States Army Air Corps, the 8A-5 is latest in a series previously purchased by Peru and Iraq.

Powered with a 1200-horsepower Wright Cyclone Engine, the craft has top speed in excess of 265 miles-per-hour, with service ceiling of nearly 32,000 feet. One of the most formidable of its type, the airplane is armed with seven machine guns, and although primarily an attack ship, it has substantial bomb capacity.

Model Designing Simplified

(Continued from page 23)

(M) = 3-1/2 times chord = 10.5 in.; stabilizer area = 1/3 wing area = 20 sq. in.; stabilizer span = 0.45 span of wing = 9.5 in.; stabilizer chord = 1/4 stabilizer span = 2-3/8 in.; fin area = 1/9 wing area = 6.67 sq. in.; fin height = 1.4 times its width = 3-3/8 in.; fin width = 2 in.; wing dihedral = 1 in. per foot of wing span = (1.75 x 1) = 1-3/4 in., the elevation of each wing tip above the center point of the wing.

The wing of the power plane should be curved or cambered as shown in figure 3, for this type of wing is twice as efficient as a flat wing and is used on all planes from which a fine flight is to be desired. The heavy black part is the cross-section of the wing which may be made of balsa sheet, the simplest type of wing. The highest point of the curve is at (H), 35% of the chord from the leading edge (A), and a distance of about 1/12 the chord above the chord line (AB). The wing section in the figure is full scale (chord 3 inches) so it may be used as a pattern when the drawings are to be made of the plane or when it is built.

Some features of the power plane differ slightly from those of the glider. For instance, the angular difference between the wing and stabilizer. In the glider it is 2 degrees. In the power plane it should be slightly more; about 2-1/2 degrees on this type of model, on which the wing is not to be far above the rubber motor (line of thrust).

This means that the wing should have an angle of incidence (see article No. 1) 2-1/2 degrees *greater* than the stabilizer. If the stabilizer is set at 0° or parallel to the rubber motor center line, the wing should be set at 2-1/2 degrees to this line. *How* this is done will be explained when a layout drawing of the plane is made.

The nose length (N) is the distance from the center of the wing to the rear face of the propeller hub. In a glider it is the distance from the center of the wing to the front end of the body or fuselage. In a power plane this should be equal to about 0.6 times the tail moment arm or (0.6 x 10.5) = 6-5/16 inches. The distance (N) is shown in figure 1.

Up to this point the basic proportions of the power plane are similar to those of the glider; now, however, the correct measurements of the propeller must be established, a flight factor not included in the glider. By applying the following simple rules any novice can design and make an

CURTISS HAWK F11C4 PURSUIT

32½" Span. Length 22¾". 1" Scale. Weight 6 oz. Color grey, top wing yellow.

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD. MOVABLE CONTROLS WORK FROM COCKPIT. A special de luxe model, one of the most beautiful ever made. Set contains a 4½" scale Wright Cyclone celluloid motor, detailed push rods, fins, etc., like real motor, 4½" aluminum cowl, 10" steel type carved prop shown, 2⅛" wheels, tail wheel, star and rudder insignia and lettering, rubber, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, washers, 3 oz. grey paint, ½ oz. yellow, ½ oz. red, 2 oz. glue, etc. All other parts are printed on balsa wood. 33"x44" scale drawing. Const. set, complete in labeled box, postpaid..... **$4.50**

GRUMMAN F5F1 SKYROCKET FIGHTER

24" Span. Length 17". Weight 3 oz. Actual Photo of Model

A sensational new scale model of the Navy's fastest fighter. The model flies well, using two 7" propellers. Const. set contains all parts printed on balsa, two 2½" turned balsa motor fronts, two 7" carved props, wheels, insignia, colored dopes grey and yellow, glue, full size scale drawing, and all parts. Const. set, postpaid..... **$2.95**

LOCKHEED ELECTRA

27½" Span. Length 19". ½" Scale.

This is an exhibition model, with all parts printed on balsa, two 2" celluloid motors, two 2" aluminum cowls, 4" chromium props, two 1½" M & M pneumatic air wheels, set of paints, and all parts. **$4.50**
Set postpaid.....

CURTISS P36 ARMY PURSUIT

37" Span. 1" Scale. Color, silver.

Set has turned motor front, set of paints, glue, all parts printed on balsa, and full size drawing. **$3.25**
Set postpaid.....

BOEING B-17 FLYING FORTRESS

44" Span. Length 30". Color, silver.

Set has all parts printed on balsa, four 2" turned balsa motor fronts, four 4" carved props, celluloid wheels, set of paints, glue, and full size drawing. Set postpaid..... **$4.50**

SPECIAL DE LUXE SET. Includes following exhibition equipment: Four 2" aluminum cowls, four 2" celluloid motors, four 4" 3-blade cast metal propellers, two 2¼" M & M pneumatic air wheels. **$6.25**
Const. set, postpaid.....

BOEING F4B4 NAVY FIGHTER

22½" Span. Length 14½". ¾" Scale.

Set has 3" celluloid motor, 3¼" tapered aluminum cowl ring, set of paints, etc. Postpaid..... **$2.95**

BOEING P26A ARMY PURSUIT

22" Span. Length 17½". ¾" Scale.

Set has 3" celluloid motor, 3¼" tapered aluminum cowl ring, paints, etc. Postpaid..... **$2.75**

NORTHROP A-17 ARMY FIGHTER

24" Span. Length 17". ½" Scale.

Set has 7" prop, turned motor front, wooden wheels and complete set of paints. Postpaid..... **$2.50**

NEW TAYLORCRAFT SPORTPLANE

36" Span. Length 22". 1" Scale. Weight 2 oz.

Taylorcraft Model on Floats

COMBINATION LAND AND SEAPLANE SET

A beautiful exact scale flying model with unusual flying range, so light it will rise from land or water in 6 feet. Const. set contains all parts printed on balsa, carved propeller, hardwood wheels, 2 oz. white dope, ½ oz. black, glue, full sized scale drawing, and all parts to build, and parts to make floats. Set p.p..... **$1.50**

CURTISS SO3C01 NAVY SCOUT SEAPLANE

30" Span. Length 24"

Set has all parts printed on balsa, set of paints, Scale drawing and all parts to build. Const. set postpaid..... **$2.95**

CURTIS F11C4 SOLID MODEL

10½" Span. Length 7½"

This is a special deluxe solid model. Set has completely finished balsa fuselage, cockpit cut out, routed pants, wings cut to shape, 1⅛" deluxe cast motor, alum. cowl, 3 bladed cast prop, paints, drawing and all parts. Set p.p..... **$1.50**

ORDERING INSTRUCTIONS

Orders sent west of Mississippi, add 15c postage—Foreign, 20c.

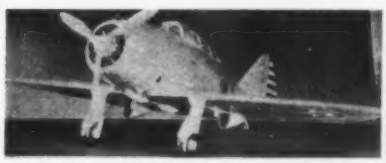
BOEING F4B4 NAVY FIGHTER

Solid Exhibition Model

22½" Span. Length 14½". ¾" Scale.

Set contains completely finished balsa fuselage, with cockpit cut out, motor hole cut out and headrest attached; all you have to do is paint it. The wings, tail, and rudder are all cut to shape, but have to be sanded to proper curve. A 3" celluloid motor with aluminum motor front, 3¼" tapered aluminum cowl, 7" scale chromium plated propeller, celluloid wheels, complete set of colored paints, glue, filler, and full size drawing. Set, postpaid..... **$4.50**

SEVERSKY P35 ARMY PURSUIT



32" Span. Length 25". 1" Scale. Color, silver.

Set has 4" turned balsa motor front, 10" carved prop, balsa wheels, tail wheel, rubber, all parts printed on balsa, 3 oz. silver dope, ½ oz. black, 2 oz. glue, etc., insignia, and full size scale drawing. Const. set in labeled gift box, postpaid..... **$3.25**

New Catalog No. 6—10¢

Beautifully illustrated 7⅛"x9½" 16 page catalog showing large photos of Army and Navy Fighters, Gas Motors, Gas Models, etc. Includes 4-page 1941 catalog supplement. Get yours today. 10c coin.

MINIATURE AIRCRAFT CORP.

83 LOW TERRACE
STATEN ISLAND, N. Y.

SO FAST—*its own shadow can't catch up!*

The BELL AIRACOBRA

Authentic model by Air-King flies 1000 feet at 40 m.p.h.

- All parts **ready-cut** on first grade balsa with master dies for easy, sure building.
- New construction principle used for strength—this model can "take it."
- **Ready-made** propeller, hardwood, light as balsa and high thrust—for long sure flights.

This kit, first ever successfully produced with these features, is complete with all materials and full size plans for quick, top notch assembly.
By mail, postage 15c ex. Price only..... **$1.00**

Kits and Gliders—5c to $1.00. Catalog 3c stamp.
Dealers, jobbers write on letterhead.

34" Wingspan

Two other models in this ready-cut kit series with all the features and same price as Airacobra: LOCKHEED TWIN MOTOR INTERCEPTOR (both motors work) and the CURTISS P-42 PURSUIT.

AIR-KING MODEL AIRCRAFT, INC. 5204 S. E. Foster Portland, Oregon

efficient propeller for his first plane without the slightest trouble.

A propeller is nothing more than a combination of one or more blades or wings radiating outward from a central hub, and which rotate about the axis of the hub. By moving through the air the blades generate a force perpendicular to their surfaces, in the same manner as a wing. In a wing this force is called "lift"; in a propeller, "thrust." It is the force which pulls the plane forward.

This vital part of the plane has three important characteristics: diameter, blade angle and area. It also has "pitch" but this is a theoretical value depending upon the diameter and blade angle, so it need not be considered here. The diameter is the distance across the circle described by the blade tips when it revolves. In a two-blade propeller it is the distance from one blade tip to the other. (D, figure 1.) The larger the diameter the greater will be the amount of power it can convert into thrust, and the more power will be required to turn it at a given speed.

The blade angle is the angle between the chord line of the blades at their tips and the plane of rotation, shown in figure 4. The larger this angle is the larger is the "bite" of air taken by the blades. In other words, the pitch is greater. Don't confuse pitch with blade angle. The former is the distance a propeller screws itself forward through the air in one revolution. This distance depends on the diameter as well as the blade angle.

The blade area is the total area of one side of the blades bounded by their outline; the latter being formed by the leading and trailing edges of the blades and the curved ends.

For any particular plane it is very important that the three factors, diameter, blade angle and blade area, have the correct values. These depend on the proportions and size of the airplane and may be easily determined.

The diameter of a propeller should be equal to 1/3 to 1/2 the wing span. High-powered planes should have large diameters. A medium value will serve well for this model, so a value of 0.38 of the wing span or 8 inches will be chosen. The propeller will be of the two-blade type, so it will be 8 inches from tip to tip.

The blade angle is measured by the ratio between the depth and width of the propeller (not width of blade). The depth is equal to the depth of the propeller hub, without it being cut away as is sometimes customary, or equal to distance (d) shown in figure 4.

The propeller width is equal to the line (w) in figure 4. This is the projection on the plane of rotation of the blade tip before the corners have been cut away to give the tip a rounded, curved outline. It is obvious now that the larger is (d) relative to (w), the larger the blade angle will be. The best average angle, commonly used, is one in which (d) = (1/2w) or (w) = (2d), so this value will be chosen.

From this it becomes apparent that the larger (d) is the wider the *blades* will be and the greater area they will have. So (d) is actually a measure of the blade area for any given diameter propeller.

The blade area should be proportional to the wing area for any angle of climb desired for the airplane. The greater the area, the greater will be the capacity to climb provided the correct power is applied to the propeller. If the area is small, applying power will only produce greater angle of climb at a great waste of power. So the area must be sufficient to "grip" the air at the desired climbing angle, using the power efficiently.

The correct blade area may be established by means of a very simple rule, without involved calculations, usually required.

As (d) is a measure of the blade area, all that is necessary is to make (d) to a certain proportion of the wing chord. Under these conditions (d) and the blade area will vary as the chord and the wing area, for any constant wing span, and propeller diameter.

If (d) is given a value of 1/4 the chord, a medium steep angle of climb will be possible. The chord is 3 inches, so the propeller depth (d) should be 3/4 inches.

Now the propeller width can be determined for (w) = 2d. Therefore (w) = 1-1/2 inches.

These are not arbitrary measurements chosen without purpose, as it might appear to the novice; for when a propeller is cut from an oblong block having these measurements, by a precise method, it will have the correct proportions and helical shape that give highest efficiency. In other words, the designing of a propeller consists in determining the correct measurements of the block from which it is to be carved.

Therefore, if the propeller of our first power plane is carved from a block 8 inches long, 3/4 inches deep and 1-1/2 inches wide, it will have the correct diameter, blade angle and blade area. Figure 4 shows the block in dotted lines and how the propeller

THE RED FLASH STICK MODEL

KIT NO. 264

Class B Flying Stick Endurance Model. Proven time—6 minutes, 13 seconds on first flight. Large 28" wing span gives a stable flight and has a nose for those high risers.

28 INCH WING SPAN

ONLY 25c EACH

AT YOUR DEALER OR DIRECT FROM FACTORY

Add 10c for postage and packing when ordering by mail.

The **PEERLESS MODEL AIRPLANE CO.**
CLEVELAND, OHIO

West Coast Distributor: Offenbach's Hobby Craft Supply Co., 1452 Market St., San Francisco, Calif.

will look when carved from it correctly, in heavy lines.

Now the necessary basic proportions of the plane and all its units have been determined and a layout drawing may be made showing the proper position and attitude of the parts relative to one another. This is the second step in the procedure of designing your plane which will be explained in detail in the next article, No. 3. Prepare by sharpening your mind and pencils.

Gas Lines

(Continued from page 26)

of thrust. The latter feature is not too high to prevent a steep, zooming, climbing effect.

Picture No. 4 tells a story: Apparently Louis Garami is being "convinced" against his will by Joe Mastrovitch. You might imagine that he is saying: "Well, it must be so but I have my doubts." This was taken at a recent contest in which Garami smashed up his wing. Mastrovitch very generously loaned him one of his square-ended box wings to use. In the picture Mastrovitch is trying to convince Garami of the value of the square-ended wing. As a matter of fact, there is something in what Mastrovitch says; for, at the end of his wings, he has vertical plates which keep the airflow smooth and effective with the tips. This is an old trick in wind-tunnel practice and if properly applied gives resultes which are equal in effect to the highly efficient elliptic-tip variety.

Picture No. 5 shows a very unique ship: the brain-child of J. J. Abenroth of the Ben Franklin Store, Franklin, Ky. Mr. Abenroth has been experimenting with tailless planes and the plane shown here is his latest development of this type. Unlike planes of this variety, this one does not have a sweep-back. Mr. Abenroth says he has discovered a way to stabilize the ship without this feature. Apparently he uses a narrow, auxiliary plane beneath the trailing edge of the large planes.

He says he has been endeavoring to develop a design suitable for combat. In this ship a gunner at the rear of the short, stubby fuselage would have perfect vision and a large firing arc. He says, given any wing, that he can obtain a perfect flight after a few problems in simple arithmetic are solved and his sub-wing is constructed and attached accordingly. The model shown is an extremely reliable flier and has been demonstrated before U.S. Army officials at Wright Field, Dayton, Ohio, who appeared extremely interested.

Mr. Abenroth does not tell us the secret of his design, which leaves room for numerous experiments which you can make along this line in order to determine how stability is assured. The editor suggests that possibly the sub-wing is attached at an angle negative to the chord of the large wing.

Apparently model airplanes are growing up, as shown in picture No. 6. If they keep on they can very readily serve as mock-ups for big ships. Here you see the 12 ft. fuselage of an 18 ft. gull-wing amphibian gas model. The stabilizer has a span of 6 ft., mounting twin rudders. Its builders, Vincent Maida and James Fitzpatrick of Mt. Way, Lyndhurst, N. J., are shown back of the fuselage. Having gone as far as this in size, we wonder why these two young men

Power, Speed, Endurance

are yours in a greater measure, if you are the owner of a

FORSTER "29"

Only a few months in the field, it already has many "firsts" to its credit. Leading model flyers are depending on it for top performance.

The FORSTER "29" gives you a greater total of satisfaction, in Design, . . . Performance, . . . and Value,—a new disk rotary valve of greater volumetric efficiency, hardened, lapped, and balanced; . . . a new design high compression combustion chamber; . . . a hardened and individually lapped high dome steel piston; . . . a one-piece fully counterbalanced crankshaft and tubular steel piston pin, both hardened and ground . . . a new piston pin snap lock, . . . and the exclusive Propeller Hub Lock that prevents the propeller from being thrown. As to Precision Workmanship,—well, you never saw anything like it!

Swinging an 11" diameter propeller, it develops a full 1/5 horse power. See it and hear it perform, then decide for yourself. No other is like it!

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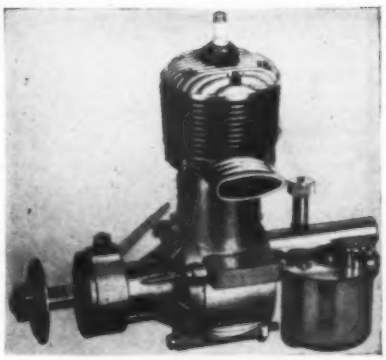

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EXPLORER (50 inch wingspan)

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Kit contains all parts and materials needed such as: Printed wood parts, new Whitfield light weight bamboo paper, Advanced green end precision cut hard balsa, streamlined wheels, semi-finished wood blocks, detailed plans, special motor mounting instructions and plenty of dope and cement. MEETS ALL THE LATEST A.M.A. REQUIREMENTS AND SPECIFICATIONS.

This kit: Is reasonable in price
Is structurally sturdy
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Is beautiful in appearance
Is easy to build
Has a High lift wing section and super climb
Has a long flat glide
Has latest type high mounted elevator

(DEALERS and JOBBERS write in for our propositions on our line—Submarine-A24, Sea Skipper-18, Sailboat D.B.-9, Twin Gliders, Advanced Racer, Green End Balsa, Hobbywood (California Sugar Pine), motors, accessories and supplies).

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KITS CONTAIN: Cut to outline shape, wings, fuselage, tail surfaces, etc. Insignia, metal paper, aluminum cowls where needed, full size plans. Wing spreads up to 23 inches. Plans only for any of the above kits, 3 for 25c postpaid. No stamps or C.O.D.'s on plans alone accepted.

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NOTE: All coils are equipped with high-tension snap-on leads.

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At your dealer or direct if he can't supply you

AERO SPARK CO.
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did not build a full-size craft. Anyone with imagination can understand the thrill which these young men will have when this plane takes the air. It is powered with four Brown engines mounted in the wing, two pushing and two pulling. The fuselage and rudders are entirely planked. When finished it will have a two-way radio, controlling rudders, elevators and ailerons.

Picture No. 7 shows one of the first successful canard-type gas models, built by Bill Krecek of 621 N. Orange, Glendale, Calif. Bill says it has made numerous successful flights. He, like Al Rubin, has discovered the secret of successful canard operation; namely, the center of gravity must be ahead of the leading edge of the rear wing a distance equal to at least 2/3 the wing chord. The white mark on the side of the fuselage, shown in the picture, indicates the C.G. position. There are a number of other "tricks" in canard design which help the flight materially. A disclosure of these will be forthcoming in succeeding issues.

Krecek says it was necessary to put 6 oz. of weight in the nose of the model in order to make it balance properly. The ship then weighihg exactly 31 oz., had a wing loading of 14.9 oz. per sq. ft. This made the glide quite fast. May we suggest instead of adding weight that the batteries and coil be placed in the forward part of the fuselage so that the C.G. will be properly located. Judging from the picture of this machine, we also would say that the stabilizer was too small compared to the rear wing for the most efficient operation. Like other types of models, the area of the stabilizer should be approximately 1/3 of the area of the rear wing. In a pusher, of course, the stabilizer is forward of the main wing.

From time to time model builders have endeavored to develop automatic stabilizing devices. One of the most successful ever produced is shown on a model in picture No. 8. It was developed by Dr. C. H. Vance, president of the Pomona Gas Model Association of Pomona, Calif. This device was invented and patented as long ago as June, 1932. In the picture you will see little vertical auxiliary fins attached to the upper surface of the wings. These operate the ailerons. When the plane banks, to the right and it slips sideways, or pressure is exerted against the right side of this, the fins push them to the left, as shown in the picture. This action deflects the right aileron on the low wing, raising the aileron on the high or left wing. This aileron action rights the plane.

Now if you will look carefully you will see a small auxiliary plane over the cabin at the nose of the fuselage. This is set at a negative angle; consequently when the plane noses upward and approaches the stalling point, considerable lift is exerted on this auxiliary wing which moves it in such a way as to operate the controls for the elevators. These are deflected, lifting the tail and righting the ship.

At the left of the picture you will see a high-wing plane. The vertical wing fins, in this case, are fastened to the underside of the wing, as shown. This is an exceedingly unique device, being similar in some respects to an automatic stabilizing mechanism developed by Martin some years ago.

Though a number of twin-cylinder engines have been developed they are not in common use; consequently when used to power a model it is worth noting. Picture No. 9 shows a unique twin, designed by Neal M. Kohler of 316 N. 4 Street, Lewisburg, Pa. Mr. Kohler is an engine expert and has developed many types. You will note the gas tank at the side of the engine with the gas control screw and the double lead in to the cylinders. This engine will turn a 15-inch diameter, 7-inch pitch prop at 4800 r.p.m. with practically no vibration. Another engine tested with the same prop, which had nearly the same displacement and was in good running order, turned it at only 3100 r.p.m.

CONTESTS

Illinois

Sunday, October 13th, in Chicago, provided a cool, clear sky for the fifth annual Chicago Park District outdoor championships. With a steady ten-mile breeze from the northeast, 250 contestants readied their models for official flights. Five events were on schedule—Class A, B and C for the gas models, and rubber power events for stick and fuselage models. Many of the contestants entered two, and in some cases all three of the gas events, while in rubber power most everyone interested entered both events, all, no doubt, shooting at the Grand Championship trophies for both gas and rubber power. These trophies were awarded on the basis of total official time garnered by any one contestant in the gas events for the gas trophy; and in both of the rubber power events for the rubber power trophy.

The gas trophy, which has been in competition for five years, was carried off to Milwaukee, Wisconsin, by Walter S. Gregorski, with a total time of 1014.6 seconds made in three official flights in Class A, and three in Class B. Gregorski's best flight was 3 minutes 53.3 seconds made in Class A. This highly-prized trophy remains in the winner's possession until next year's championship event takes place. An exact miniature, which accompanied the large trophy, is retained by the winner.

SEE PAGE 7

GUILLOW *presents* 6 New MODERN MILITARY PLANES

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Models that are making headlines. Swift British fighters, newest American aircraft. Each one an amazing replica of its "big brother."

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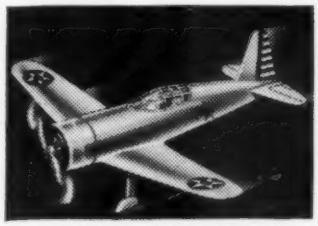
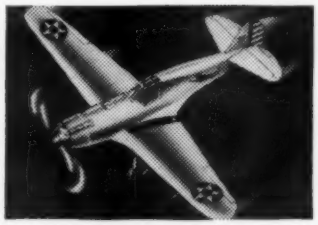
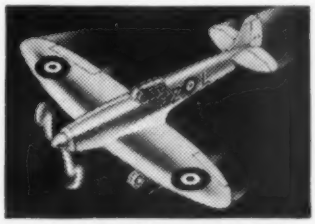


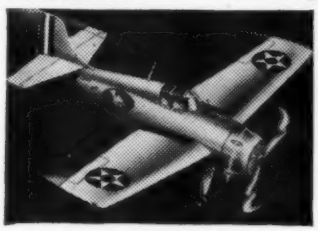
VULTEE VANGUARD 48



CURTISS P-40



SUPERMARINE "SPITFIRE"



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BELL PURSUIT P-39

BREWSTER FIGHTER

IMPORTANT: Watch the next issue for the announcement of 3 NEW 50c "in-the-news" flying models. Exceptional values!

Also available:—a complete line of ready-to-fly gliders retailing at 1c to 10c—shelf model construction kits at 2 for 1c to 25c—flying model construction kits from 5c to $1.50.

PAUL K. GUILLOW
WAKEFIELD, MASS.

Jim Tangney of Aurora, Illinois, put together three nice flights in the rubber power fuselage event for a total of 672.0 seconds, with a best single flight of 6 minutes 13.5 seconds.

The flying scale model event, while rather disappointing from the standpoint of the number of entries, produced some very fine examples of this delicate art. Armando Sinibaldo of Chicago took the trophy in this event with a fine flying model of a Cessna Airmaster. Ed Petkus of Cicero, Illinois, took second with a dandy scale model Caudron, on which the workmanship was superb, but he could not match Sinibaldo's time when it came to official flights.

Picture No. 10 shows Joseph Konefes of Chicago, winner of the Class C Gas Event, preparing his model for a take-off. His time was 924.9 seconds.

Massachusetts

Picture No. 11 shows the officers and Council of the Holyoke Gas Model Club of 650 East Street, Holyoke, Mass. Louis H. Nye, Jr., secretary, tells us that now there are 40 members and meetings are held on the third Sunday of every month. This club would like to contact all other clubs within a radius of 50 miles. Any who would care to come up and visit would be very welcome. Meetings are held at 7:30 p. m. at 523 High St.

California

Picture No. 12 shows the activity on the flying field at the recent State Championship Air Model Meet held at San Bernardino on Sept. 22nd. There were 312 models entered from 61 cities.

One of the most unique planes at the contest was Barney Snyder's box-plane. It was not designed particularly for contest performance but rather for exhibition. Barney is shown, in picture No. 13, starting this unusual ship. It consists of a cardboard airplane-model-kit carton on which is mounted motor, wings, tail plane and a landing gear. Who would have thought it possible? We have heard of barn-doors flying but this is a new one! After this model builders should be careful not to destroy the boxes in which their kits arrive!!

Connecticut

Sunday, September 29th, at the New Haven Municipal Airport over 5,000 spectators watched the second annual Connecticut Gas Model Airplane Championships sponsored by the Elm City Gas Bugs, one of the most active gas clubs in the east. One of the outstanding events of the day was when the gas model built by Chester Kawalkowski of Bridgeport, Connecticut, soared through the air for 17 minutes and 38 seconds to win for its builder the Class C trophy and the Connecticut State Champion Trophy.

This year's Connecticut contest, with 154 entrants from all of the eastern states, according to the Academy of Model Aeronautics, was one of the largest held in the northeast. The contest was directed by Salvatore Russo, who was assisted by William Paulson, Joe Paulson, Fred Paulson, Leon Bombalicki, Edward Lipowski, Jules Agne, Melvan Agne, Mr. and Mrs. Agne, Hellen Paulson, Irwin Polk, and members

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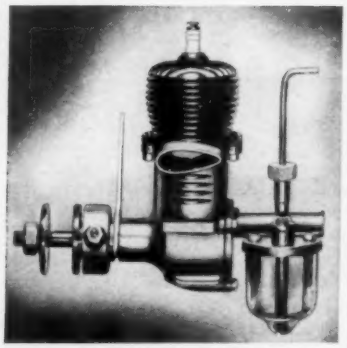

The 1940 Bantam created the best single year record of any motor in gas modeling history. It established a new standard for Class A performance, setting up records that in many meets surpassed Class C times. The 1941 Bantam is even better, even hotter, with the highest compression ratio of any model motor insuring **SUPER performance on every flight.**

6 MONTH GUARANTEE!

The 1941 Bantam is guaranteed for six months against defective materials and workmanship. Miniature Motors stands behind each one of these sensational engines, insuring you of real satisfaction . . . real value . . . while the Bantam insures real performance.

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Blitz ...THE ONLY COIL UNCONDITIONALLY GUARANTEED

Weight 2 ozs. scant

BLITZ will NEVER fail you.

HOLDTITE Hi-Tension Terminal

Double clip, SNAP-ON Hi Tension Lead Included with this BLITZ.

FOR CLASS "A" "B" & "C"

Planes, also Race Cars & Boats

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Crash-Proof case hermetically sealed against gas and oil seepage!

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UNFALTERING UP TO 20,000 R. P. M.

Lightning fast start—and unfaltering performance EVERY TIME! This BLITZ is constructed to deliver power and service the equal of coils costing double the money! See the unconditional guarantee below to back this up! BLITZ contains features found in $2.50 coils—yet it costs only $1.00 AT ALL DEALERS—or direct.

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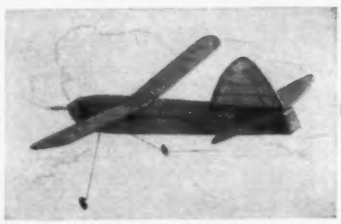

Built for speed and flash. This 20" long Speed Plane will give you the thrill of a lifetime as it streaks through the air like a bullet.

60 MILES PER HOUR

ONLY 25c EACH

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Add 10c for postage and packing when ordering by mail.

The **PEERLESS MODEL AIRPLANE CO.**
CLEVELAND, OHIO

West Coast Distributor: Offenbach's Hobby Craft Supply Co., 1452 Market St., San Francisco, Calif.

of the New Haven Exchange Club. Winners were:

Class C

	Average Times
C. Kawalkowski, Bridgeport, Conn.	6 Min. 42 Secs.
D. Johnson, Poughkeepsie, N. Y.	5 Min. 45 Secs.
W. Gillette, Noroton Heights, Conn.	3 Min. 21 Secs.
W. Schrode, Glen Ridge, N. J.	2 Min. 29 Secs.
P. MacCready, Jr., New Haven, Conn.	2 Min. 17 Secs.

Class A

J. Beshar, Paterson, N. J.	3 Min. 3:1 Secs.
M. Karl, New Canaan, Conn.	2 Min. 26 Secs.
A. Downs, Boston, Mass.	1 Min. 29 Secs.
L. Garami, Woodside, L.I.	1 Min. 25:5 Secs.
G. Travis, Norwalk, Conn.	1 Min. 25:1 Secs.

Class B

K. Allery, Holyoke, Mass.	1 Min. 48 Secs.
E. Soltis, Yonkers, N. Y.	1 Min. 17:3 Secs.
G. Gerard, Yonkers, N. Y.	1 Min 15 Secs
W. Spiecer, Norwalk, Conn.	1 Min. 13 Secs.
Wm. Schroder, Glen Ridge, N. J.	1 Min. 6 Secs.

We are indebted for this information to Salvatore Russo of 666 Main Street, East Haven, who is secretary of the Elm City Gas Bugs, New Haven.

One of the unusual stunts at the contest was staged by Louis Garami. Louis did not bother to launch his ship as is customary —from a run-way. He merely pointed its nose upward and released the model. It had so much power it acted as a helicopter, rising vertically. In picture No. 14 Louis is giving a demonstration of this unusual method of launching.

Minnesota

The Sixth Annual Northwest Model Air Meet was held on Sept. 22nd at the Nicollet Model Airport, Minneapolis. Events were held for Class A, B, C Gas as well as Stick and Cabin Rubber-Powered models. The meet was directed by Mr. Richard Billett, who has been an ardent leader in model aviation for a number of years and the activity in this district is largely due to his unlimited energy and interest, which he has given to this sport.

Picture No. 15 shows Murray Ellis of Rochester, Minn., tuning up his powered soarer for a flight. His ship, powered with an Ohlsson "60," turned in three beautiful flights to total 11,023.9 seconds, which time gave him second place in Class C. Contestants were present from the Dakotas, Iowa, Wisconsin and, of course, Minnesota. There were over 250 models entered. Results were:

	Age	Total Time	Award
Class A Gas Powered Event			
Bill Bennett, Minneapolis	15	365.6	Billett Hobbycraft Trophy
Robert Toft, Minneapolis	20	292.8	Madewell Motor, Berg Model Shop
Rohland Dexter, St. Paul	17	265.7	1 hr. Flight Instruction, E. Hinck
Class B Gas Powered Event			
Glenn Tempte, Minneapolis	20	936.0	Toft Trophy
Ronald Kirk, St. Paul	19	620.6	Madewell Motor, Midget Airways Shop
Budd Butcher, Minneapolis		518.6	1 hr. Flight Instruction, Shaw Serv.
Class C Gas Powered Event			
Don Bergquist, Minneapolis	18	1254.9	Mrs. Charles "Speed" Holman Trophy Star-Journal Trophy
Murray Ellis, Rochester	40	1123.9	Madewell Motor, MMAC
Bob Knutson, Austin	19	389.9	1 hr. Flight Instruction, Minn. Skyways
Rubber Powered Stick Event			
Fred Emmert, Minneapolis	17	791.4	Lief Erickson Trophy, MMAC miniature
Conrad Renning, Minneapolis	30	743.6	Madewell Trophy, MMAC
John Belter, Willmar	16	624.5	Reconditioned Brown B, Schindler
Rubber Powered Cabin Event			
D. Lagerstedt, St. Paul	30	788.0	Aero Dopes Trophy
Robert Champine, Minneapolis	19	609.9	Madewell Motor, MMAC
Ronald Kirk, St. Paul	19	487.0	Buccaneer Spec. Gas Kit, MMAC
Arnold Del Carlo, St. Paul	19	380.4	Zipper Gas Kit, Modelcraft Dist.
Charles Collins, Minneapolis	16	359.7	Spook Gas Kit, MMAC

Air Ways

Peter Bowers, an old model builder, is now at the Boeing School of Aeronautics, but he has found time to continue building. He sends picture No. 16, showing a very beautiful rubber-powered scale model of a Fokker D-8. It is built to a scale of one inch to the foot, having a span of 31-1/2 inches. It includes all details and is a beautiful flier. This ship lends itself especially

to model design.

Picture No. 17 shows a dramatic moment in a model builder's life. Here you see Joel Isenberg's gas job taking off at the annual Canadian Nationals. Joel has established himself as the Canadian National Champion for two successive years.

Allan Kitchel, Jr., of 424 E. 52nd Street, New York City, writes:

"In 1931, the keel was laid for the first in what has grown to be a sizable collection of World War (No. 1) model planes! That first miniature in a set that now numbers thirty-six was the all-red Fokker Triplane flown to victory and death by Baron von Richthofen, the Red Knight of Germany. Today, after using gallons of paint, yards of balsa wood, quantities of pins, lead wheels and knife cuts—the collection is going places after hours of grief and sleepless nights!

"For the legions of those interested in World War flying, especially those who have built models, we venture to say there is none larger than this one. The scale of the models is approximately 1/8th inch to the foot—which means that the smaller ones have wings about three inches long—while the Handley-Page, Caproni and Caudron 'Twin' measure about 8 inches across! The reason for the size may seem foolish to some—but we have always been interested in miniatures and this seemed the time to put that interest into something worthwhile!

"Following is a list of the models included in the collection: Fokker Tripe, Fokker D-7, Spad, Nieuport 27, Nieuport 28, Fokker D-8, Fokker, 'Eindecker,' Rumpler, Taube, Hannoveranner, Albatross, Pfalz Tripe, Pfalz Scout, Sopwith Camels, DH-4, Vickers Gun Bus, F.E.2-B, Curtiss 'Jenny,' Nieuport Tripe, Caudron Twin, Handley-Page, Bristol Fighter, Sopwith Dolphin, S.E.-5, Caproni, S.V.A., Sopwith Tripe, Roland DR-1, Salmson, Breguet; Voisin, B.E.2-C, Freidrichshafen, Morane Parasol, R.E.-8, and Bristol Bullet.

"The collection—despite accidents—has survived its nine years mainly encased in a box in the closet. Recently it came out to have its pictures taken—for Universal's Stranger Than Fiction reel. Since then it has gone on exhibition at the Empire Trust Co., 120 Broadway, New York. It's finally come into its own—to show others what the boys flew back in the days of the first Big Scrap. Long may they all wave!"

Picture No. 18 shows a group of some of the little ships.

The sixth Annual Model Aircraft Meet, sponsored by the Detroit Chapter of the Academy of Model Aeronautics, has come and gone. The overwhelming response from the contestants anxious to compete in this meet and the number of cities from which they came set up a high mark to shoot at in the future. One hundred and seventy-seven model pilots from Michigan, Ohio and the Province of Ontario, Canada, entered the meet representing the following cities: Detroit, Jackson, Lansing, Dearborn, Pontiac, Keego Harbor, Battle Creek, Monroe, Mt. Clemens, Saginaw, River Rouge, Kalamazoo, Hamtramck, Franklin, Ferndale, Clinton, Marshall, Royal Oak, Algonac, Tecumseh, Birmingham, Grand Rapids, Highland Park, Cleveland, Toledo, Sylvania and Windsor.

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Burgess Batteries

Speaking of their standby radio instruments, "United" states

"We use Burgess Batteries exclusively on this equipment because, as you can readily see, we have to have batteries we know will furnish the power supply if anything goes wrong with the other equipment."

They can't afford to take chances—and neither can you.

Burgess Model Ignition Batteries

contain the same quality features that have won United's confidence. For the ignition power in your model plane or model racer, insist on Burgess Batteries

United Airlines depend on Burgess Batteries in their 1940 Mainliners and the 1941 Super-Mainliners (shown above).

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24"

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18" BALSA STRIPS

1/16 sq.	100 5c
1/16x1/4	36 5c
1/16x3/16	19 5c
1/16x1/4	16 5c
3/32 sq.	31 5c
1/8 sq.	31 5c
1/8x1/4	10 5c
3/16 sq.	9 5c
1/4 sq.	6 5c
1/4x1/2	3 5c

18" BALSA SHEETS

1/64x2	6 10c
1/32x2	9 10c
1/16x2	8 10c
3/32x2	7 10c
1/8x2	6 10c
3/16x2	3 8c
1/4x2	3 9c
1/2x2	2 11c

3" and 36" cost twice 18"; 3x36, 3 times.

18" BALSA PLANKS

1/4x1/2	2 5c
1x1	5c
1x2	9c
2x2	16c
2x3	22c
2x6	38c
3x6	72c

6 FOOT BALSA

1/8x3/16	12 20c
1/8x1/4	10 20c
3/16 sq.	8 20c
1/4 sq.	6 20c
1/4x1/2	3 20c
3/4 sq.	2 20c
1/2 sq.	2 20c

Sheets, 4 times 18".

PROP BLOCKS

1/2x3/4x5	7 5c
1/2x3/4x6	6 5c
5/8x1x8	3 5c
3/4x1 1/4x10	3 8c
3/4x1 1/4x12	3 9c
1x1 1/2x12	ea. 5c
1x1 1/2x15	ea. 6c

BAMBOO

1/16x1/4 Doz. 10c

REED

1/32	10 ft. 3c
1/16	8 ft. 2c
1/8	6 ft. 3c
1/4	3 ft. 3c

BROWN RUBBER

1/16 sq.	15ft. 5c
1/8 flat	15ft. 5c

3/16 flat 12ft. 5c

PROPELLERS

Balsa	Paulo wina	Gas Mod.
6 - 4c	- 7c	-10 -25c
7 - 5c	- 8c	-11 -25c
7 - 6c	-13c	-12 -25c
8 - 7c	-15c	-14 -35c
9 - 8c	-19c	17
10 - 9c	-23c	
12 -10c	-25c	
14 -12c	-35c	
15 -15c	-44c	
16 -16c	-45c	
18 -25c	-X	

CEMENT CLEAR DOPE AND THINNER

1/2 pint	25c
Pint	45c
Quart	80c

COLORED DOPE

1/2 pint	50c
Pint	85c
Quart	95c

CELLULOID

8x10 inches 10c

TISSUE AA

White doz.	15c
Colored doz.	19c

MODEL KNIFE

Steel Blade 10c

WHEELS PER PR.

Birch	Celu.
1/2 1c	-X
3/4 2c	-5c
1 3c	-7c
1 3/4 4c	-10c
1 1/2 6c	-16c
2 1/2 X	-X
3 X	-34c

MUSIC WIRE

.014 6ft.	2c
.020 6ft.	3c
.028 6ft.	3c
.034 6ft.	6c
.040 6ft.	6c
.063 3ft.	5c
1/8" 3ft.	20c

PROP SHAFTS

Small	5 for 3c
Medium	4 for 3c
Large	3 for 3c

THRUST BEARINGS

Small	1/2 doz. 5c
Large	1/2 doz. 7c

ALUM. TUBE

1/16	6c ft.
3/32, 1/8	7c ft.
3/16, 1/4	9c ft.

SHEET ALUM SQ. FT.

.003 10c .010 15c

GAS MODEL SILK

Best qual. 40c yd.

BAMBOO PAPER

White ea. 5c
Colors 2 for 15c

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1 1/4 cu. 1 1/2 V $3.00
2 1/2 cu. 3V $2.75

AERO SUPER COIL

1 1/2 volt $3.00
3 volt $2.75

AUSTIN TIMER

P.P. ea. $1.25

CHAMPION PLUGS

3/8 or 1/2" 65c

WASHERS

1/8 or 3/16 O.D. Dozen 2c

GAS MOTORS

Ohlson 19 $14.50
Ohlson 23 $16.50
Ohlson 60 21.50
Forster 17.50
Forster 29 B 18.50
O. K. Special 21.50
O. K. Twin 35.00
Ranger 14.75
Dennymight 15.95
Brown Jr. D 12.50
Brown Jr. B 21.50
Bantam 16.50
Syncro Special 3.95

M. M. WHEELS PER PAIR

1 1/2, 1 1/2 x 1/8 50c
1 3/4, 2" 60c
Gas. Mod. 2 3/8 90c
3 1/4, $1.50; 3 1/2 $2.75; 4 1/2 $2.75; 6" $4.00.

ELECTRIC SOLDERING IRON

Each 40c

NOSE PLUGS

1/2, 8, 5c; 3/4, 6, 5c; 1" 4, 5c.

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Drop forged nickel molybdenum, perfectly counterbalanced crankshaft.
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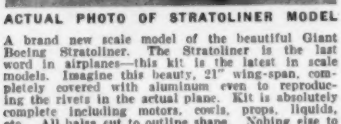

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It is easy and fascinating to build real planes in miniature with sheet aluminum covering. Your finished job will be a masterpiece with a beautiful, lustrous finish that you will be proud of. The kits are complete with everything necessary to make a finished model, with the exception of liquids. The photograph will give you an idea of how the finished model will look.

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13" CONSOLIDATED PB2A	.75
10" BELL P 39 PURSUIT	.50
9" NORTHROP A17A	.40

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A crowd of spectators, estimated at 10,000 enjoyed and applauded the many thrills and spills performed by the airmen of tomorrow. The long line of automobiles parked on the highway and the adjacent fields gave every appearance of the vicinity of Briggs Stadium when the Tigers were playing a World Series game.

The technical operation of the contest was so well handled that not one complaint or protest was filed with the contest committee. The deep smiles and the complimentary words expressed by the contestants was a tribute to Ed Manning, the Meet Manager and his well-trained staff.

The modern and up-to-date method of retrieving lost planes was accomplished by a two-way mobile radio system.

The Outdoor Cabin Event became a Battle of Champions with Lavelle Walters of Windsor, Ontario, the Canadian Wakefield Senior Champion taking first place; George Sass, the U. S. National Champion, second place and Ed Naudzius the state champion placing third.

Bud McClellan won the Detroit Chapter Club Trophy for accumulating the highest total time for three official flights in any event. Although he placed second in Gas-Class B, his time was greater than any other member of the club. Joseph Ryczay of Cleveland recorded the highest time for one flight when his Gas-Class C model stayed aloft for 364 seconds. Young Joe Bashore, the pride and joy of Wyndotte, was the only contestant to win more than one prize—he placed fourth in Gas-Class B and fifth in Gas-Class C. By virtue of his age, Joe, who is only 12, lends strength to the old adage, where there is a will, there is a way and let age be no obstacle.

A large number of spectators manifested a great interest in the plane entered by Mr. Russell Hoyt, a middle-aged gentleman of Pontiac, who was ably assisted by his charming wife. His model was a magnificent piece of craftmanship and incorporated all the latest developments of model aircraft construction.

Miss Virginia Smith of Detroit gave the boys no little amount of worry when she obtained 161 seconds on her first flight. The heavy wind that swept over the flying field in the early afternoon caused her plane to ground loop, eliminating her from further competition.

Official Results

Outdoor Cabin	Total Time
Laviele Walters, Windsor	535.2
George Sass, Detroit	518.0
Edward Naudzuis, Detroit	475.4
Maurice Littler, Kalamazoo	432.8
Robert Annas, Detroit	384.4

Gas-Class A	
Jack Droudilard, Detroit	338.0
George Matan, Dearborn	307.0
Al Moreau, River Rouge	307.2
Leslie Hardy, Lansing	254.6
Harold Sevarden, Toledo	231.4

Gas-Powered—Class B	
Walter Stevenson, Detroit	583.4
Bud McClellan, Detroit	531.0
Doug Stokes, Detroit	471.0
Joe Bashore, Wyndotte	460.4
Bob Wolfaton, Birmingham	330.4

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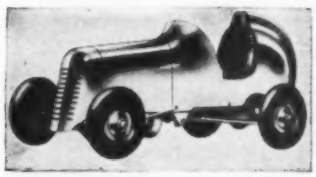

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Wheel Base 12½"—overall size 22½".

PRICE OF COMPLETE KIT

(less motor)

$12.50 LIST PRICE

AMERICAN SUPERCRAFT CORP., 711 W. Lake St., Chicago, Ill.

Gas-Powered—Class C

Dan Lapinorth, Detroit	447.8
Bud Manning, Detroit	403
Leon Marmon, Lansing	383.4
Joseph Ryczog, Cleveland	364
Joseph Boshare, Wyndotte	359.6

Picture No. 19 shows a group of modelers with their planes at the contest. In the center of the picture you will note a ship with leading edge slots; this unique device is appearing on a number of models.

Take a look at picture No. 20 and guess what ship this is! We will not tell you its origin; we will only tell you what Henry D. Evans of Sellman Road, Beltsville, Md., its builder, says about it:

"This is a picture of an original fuselage model designed to Wakefield specifications. During the past three years it has never failed to place in any contest in which it was entered. The average duration in calm air is 2-1/2 minutes."

We would like to have comments as to the origin of this ship, which we will be pleased to print in our columns in coming issues.

Picture No. 21 shows a champion, believe it or not. He is Bobby Bates of Clarksburg, W. Va., who, though only 10 years old, is West Virginia State Champion, Junior Class D, R.O.W. He made a 3-flight average of 46.1 seconds, which record was established at the Maple Lake Aquacade Hydroplane Model Aviation Meet in Clarksburg on August 11th. No doubt we will hear a lot more from Bobby as he gains in years.

Picture No. 22 shows Edward Gumell of 525 Guanium Street, Pittsburgh, at the Model Wings Contest on Sept. 29th. He placed 3rd in the Fuselage Event and is active in all contests in this area, having won prizes in many of them. For this picture we wish to thank John Harrington of 111 Key Avenue, Elm Grove, W. Va., president of the Ohio Valley A.M.A. Chapter.

One of the finest examples of scale model work that we have seen is shown in picture No. 23. Here you see a scale model Hawk constructed in complete detail. It is built to exactly 3/4" scale, having a spread of 23-5/8". It has complete movable controls and cockpit details and was built by Greg Loucks of 5662 Miles Avenue, Oakland, Calif.

CONTESTS

New York

On Saturday, October 12th, the Flying Dutchmen of Yonkers held their first Annual Gas Model Contest at Reynolds Central Westchester Airport, Valhalla, N. Y. Eighty-five contestants participated. The winners were as follows:

Class A

	Average
Eugene Orlando, Garfield, N. J.	3-05.5
Melvyn Agne, New Haven, Conn.	1-34.1
Leon Shulman, Newark, N. J.	1-25.2

Class B

Roy Love, Rye, N. Y.	1-50.8
Donald Johnson, Poughkeepsie, N. Y.	1-41.6
John Stratton, Poughkeepsie, N. Y.	1-40.6

Class C

Walter Kovalski, New Haven, Conn.	2-37.9

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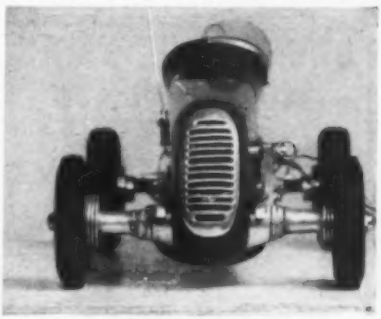

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MADEWELL	7.50	SYNCRO B-30	6.95
OHLSSON "19"	14.50	OHLSSON "60"	21.50
BANTAM	16.50	BROWN "D"	12.50
OHLSSON "23"	16.50	DENNYMITE	17.85
FORSTER "29"	15.50	O.K. "49"	12.50

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It has a 48" wing, 8" chord, with a perfect N. A. C. A. 6409 airfoil and a 28" overall. Price $1.95.
Specifications for Class A.
34" wingspread, 17" overall, 204 sq. in. Area N. A. C. A. 6408 airfoil, price $1.00.
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Class "A" motors		Class "C" motors	
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Syncro B-30	$ 6.95	Ohlsson "60"	21.50
Brownie	7.50	Atwood Champion	23.95
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Ohlsson "23"	16.50	Brown M	16.50

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William Paulson, New Haven, Conn...1-48.9
Bradford Raynor, Freeport, L. I.....1-33.4

The best time of the meet was made by Eugene Orlando with a flight of 4.32.

Ohio

The Ohio All-State Model Meet was held on Sept. 22nd at Miller's Airport. It was sponsored by the Flying Screwballs of Alliance, and there were 135 entrants and a crowd of spectators numbering 6000. Dick Korda made the longest flight of the day and was awarded two hours of flight-time by Russ Miller, owner of the airport. $250 worth of prizes, including twelve motors, were given away. The winners, in respective order, were: John Hall, Rogers; Frank Hall, Meadville, Pa.; Winston Myers, E. Liverpool; Mildred Zimmerman, Mansfield; Kim Lamb, Lakewood; George Slater, Lorain.

We thank Lyle Crist of 611 S. Union Avenue, Alliance, for this data.

Coming Events

Following is a schedule of contests held in the neighborhood of St. Louis by the Stix, Baer & Fuller Company:

Dec. 13, 9:30—Navy Speaker and Navy Movie.
Dec. 13, 1:30—Stick contest (indoor).
Dec. 14—Practice Flying.
Dec. 20, 9:30—Christmas Party.
Dec. 21—Practice Flying.
Dec. 27, 9:30—Microfilm Demonstration. Board of Awards.
Dec. 27, 1:30—Aeronuts Meeting.
Dec. 28—Indoor Contest, Class A Glider Cabin Type.
Jan. 3, 9:30—Motor Demonstration.
Jan. 3, 1:30—Aeronuts Meeting.

Sinbad's Modern Mount

(Continued from page 17)

fighting planes resulted. Thus, a question we posed in the above-mentioned article dealing with the "Defiant," viz: "Will the multi-gun power-driven turret prove its worth?" has been answered in the affirmative a hundred times in the past eight months.

The Blackburn "Skua" was one of the first to be selected for this re-armament program, and two months after the long to be remembered Dunkirk evacuation, this ship, with its huge multi-gun power driven turret and other modifications appeared resplendent in its new-type warpaint and was entered on the official Admiralty aircraft lists as the "Blackburn Roc," the ship emblazoned so strikingly on our cover this month. The Roc is an interesting ship from a dozen different viewpoints and we have been exceptionally fortunate, in this day of extreme censorship, to gather most complete data on this ultra-modern fighting bird that bears an ultra-ancient sobriquet.

The Blackburn Roc is a two-seater fighter dive-bomber of the single-engine low-wing monoplane design equipped with a retractable landing gear.

WINGS.—Outstanding feature of the Blackburn Roc wing is its folding feature to facilitate carrier-deck stowage. The wing is built up in three sections, a center section bolted to the fuselage at four points on the two spars and two outer wing panels hinged and rotating on the rear spar inner-outer wing panel joint. The upper surface of the wing center section forms the lower surface of the cockpit water-tight compartment. The center section is built up on two box spars of Alclad webs reinforced by vertical stiffeners and extruded flanges riveted to the twin webs. The ribs are of flanged plating attached to Z-section stringers. Over this framework is riveted the center section plating on the upper surface and regular Alclad sheet on the lower surface. The center section is readily detachable from the fuselage after the control wires, hydraulic lines, machine-gun control wires, lighting wires, etc., are disconnected at their respective connections. The outer wing panels are constructed slightly differently insofar as the box-spar changes into a single double-flanged design of progressively less reinforced section out to the tips. Two large circular wells are located on the under side of each outer wing panel to make way for the landing gear when fully retracted. The panels taper in both plan form and thickness out to the tip. The tips, themselves, are detachable and incorporate a firm upsweep angle of 8° 21′ to add lateral stability. Each outer wing panel encloses a large water-tight compartment between the two spars and the tip section into a point just outboard the landing gear wells.

The Alclad covered sheet is sealed to the rib and spar flanges over this area by the use of a special plastic sealing compound laid between the faying surfaces and riveted. This compound is water-proof and never completely hardens, thus making its cracking and chipping an impossibility.

The ailerons are of all-metal construction being made up of a single pressed flange spar and stamped metal ribs. The leading edge is a single formed sheet of aluminum and the entire surface fabric covered. Lead weights are riveted into the leading edge of each aileron to insure dynamic balance. The hinges are of the inset type, being completely invisible, and control is by cable attached to a simple bell-crank arrangement in the center of each surface.

The special flaps mounted on the Blackburn Roc are worthy of detailed mention.

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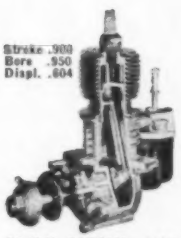

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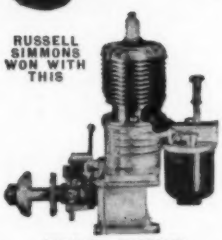
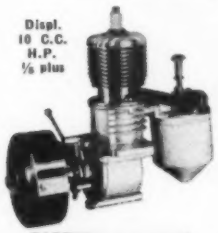
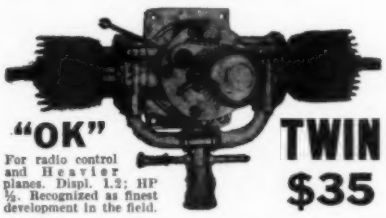


RUSSELL SIMMONS WON WITH THIS



Displ. 10 C.C. H.P. ⅛ plus



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Illustrated brochure—with wiring diagram—sent on receipt of stamp.

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START EASILY—RUN CONSISTENTLY

These flaps are utilized as double-duty surfaces for use as landing-speed decelerators and dive-brakes in addition to aiding climb after the take-off. They are mounted in slight recesses forward of the trailing edge ten inches and are hydraulically controlled. They are of all-metal construction and covered with .05 gauge sheet Alclad to withstand the terrific pressure exerted in vertical dives. Double operating arms raise and lower them and they are constructed as a closed double-faced structure.

The airspeed indicator is located in the right wingtip while both upswept tips include a handgrip, a faired recesses navigation light in the leading edge and a formation light in the trailing edge.

FUSELAGE.—The fuselage is built up on four solid-faced water-tight bulkheads and eight conventional frames all aligned and secured by Z-section channel stringers mounted vertical to the circumference of the structure. The fuselage is built in two sections bolted together just forward of the tail surfaces. The forward water-tight compartment is located beneath the front cockpit and between the water-tight fire-wall and the water-tight bulkhead just aft of the front cockpit.

The aft water-tight compartment is situated just behind the rear cockpit and terminates at the fuselage joint previously mentioned. Tunnel ducts of the hat-shaped section are riveted longitudinally through these compartments to provide space for the control cables, light wires, etc. This entire framework is covered with sheet Alclad flush riveted along the stringers but utilizing standard round-head rivets over special sections carrying greater loads.

TAIL SURFACES.—The tail surfaces are of all-metal construction with the movable surfaces fabric covered. These latter are of the balanced type. The vertical stabilizer is built up on a framework of two girder-type spars bolted to the two aft fuselage frames and is detachable. The sheet covering is riveted to the ribs and stiffeners with hollow rivets. The horizontal stabilizers are of similar construction with the rear spar set against the elevator face and the structure is full cantilever. The rudder is of all-metal construction and has a horn-type balance located within the balanced portion at the uppermost point. It is equipped with both trimming tab and balance tab, the latter of which operates automatically through constant linkage. The trimming tab is controllable while in flight from the cockpit. The elevators are interconnected through a single torque-tube running through the aft fuselage section. All control horns are located within the fuselage and control is by cable. The elevators are equipped with controllable trimming tabs along their trailing edge.

LANDING GEAR.—The landing gear of the Blackburn Roc is of the single-leg triangular-braced type and is fully retractable, each leg folding outward and upward into the wing recesses previously described by hydraulic action. Small metal plates are permanently affixed to

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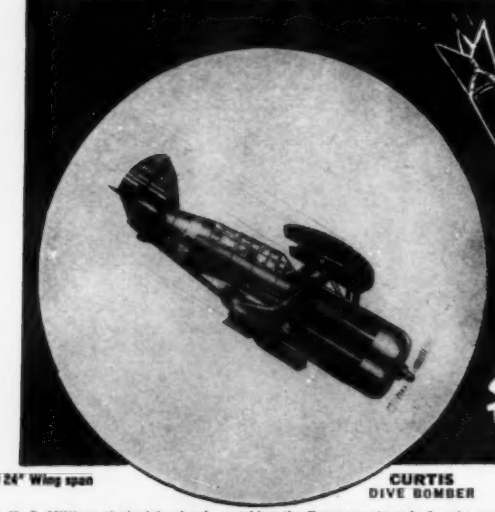

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With U. S. Military strategists closely watching the European struggle for air supremacy, the U. S. Navy is ordering for herself and her English allies huge quantities of the fast maneuverable new Curtis S B C-4 dive bombers (Note: The U. S. Navy has pioneered the type of dive bombing being used with success abroad. The bomber will turn in beautiful flights and carries a dummy demolition bomb which is sensationally dropped in flight. The kit is complete with turned balsa cowling, full size plans, model dope and cement and all wood parts printed out . . . everything to build the complete model.

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the inside of each wheel and leg assembly and function to seal the opening when in the retracted state. The hydraulic retracting strut lies in a lateral position within the wing center section and retracts in toward the center-line of the fuselage and draws the landing gear up through the angular displacement of the arm attaching link at the top of the strut.

POWER PLANT.—The Blackburn Roc is powered by a single Bristol "Perseus" Mark XII nine-cylinder radial air-cooled engine. This is the famed sleeve-valve engine for which Britain is renowned in which the inlet and exhaust ports are alternately opened and closed by the simple expedient of having holes in the piston pass holes in the cylinder walls. The engine has a displacement of 1,520 cubic inches (similar to our Twin Wasp Junior models) and is geared 0.5 to 1 with the propeller. It is a medium supercharged engine and develops its rated horsepower at 6,500 feet. The Perseus XII has a rated power output of 745 horsepower at 2,400 r.p.m. at 6,500 feet and has 830 horsepower at 2,650 r.p.m. available for take-off and maximum continued operation. For short-term duration (5 minutes) it develops 905 horsepower at 2,750 r.p.m. at 6,500 feet.

This power is converted to thrust by a De Haviland three-bladed all-metal controllable pitch propeller manufactured under Hamilton Standard (U.S.A.) license. A streamlined spinner covers and smoothes the pitch-changing balance counter-weights mounted on the propeller hub.

The exhaust collector ring of the Perseus forms an integral part of the leading edge nose cowling, each exhaust manifold being routed forward to this nose ring and thence around, down and is exhausted out to the starboard side of the engine below the cowling. Thus the exhaust gases are cooled by the air before reaching the exhaust port.

The cowling is of the long-chord type and is equipped with manually operated cooling gills completely circumferencing the cowling at its trailing edge. The carburetor is of the conventional up-draft variety, the air being taken in by a large scoop located below the engine compartment and extending two inches below the bottom cowling to eliminate skin-friction air losses.

Three ducts route the used air from the oil cooler, two to the outside and the middle one directly into the pilot's cockpit for use as a cabin heater. It may be mixed with cold air from the outside in any proportion through a small mixing valve controlled by the pilot.

ARMAMENT.—The Blackburn Roc is one of the most heavily armed fighting planes in the world, a fact not generally

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For the first time, a real small contest performance gas model. Henry Struck, on the very first test flight of the ship pictured here, turned in a time of 1 min. 5 sec. with only a 6-second motor run. Will climb as fast as any other gas model, big or small.

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HENRY STRUCK'S 54" WINGSPAN

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Everybody's raving about the new American Ace. Adapted from Struck's famous "New Ruler" gas model, the most popular ship at the 1940 Nationals and winner of three out of ten places. Designed for maximum performance with engines of .29 cubic inch displacement, it can be powered with any engine from .19 to .49 displacement.

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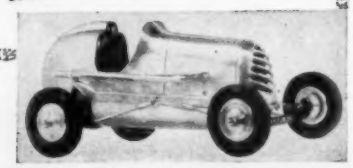

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known. Certainly it is one of Britain's most formidable answers to Hitler's sky armada. Four free-firing machine guns are mounted, two in each outer wing panel, controlled by the pilot. The muzzles lie flush with the leading edge of the wing, a standard British custom. They are sealed by small linen patches until the first shot is fired, after which they are replaced before the next flight. The now famous Frazier-Nash power driven turret is mounted amidship and commands the entire upper hemisphere of fire. It mounts FOUR Vickers-Browning 30 caliber free-firing machine guns arranged in vertical pairs in two parallel slits in the cupola turret. Thus we see that in machine-guns alone the Blackburn Roc has a fire-power of EIGHT THOUSAND rounds per minute.

In addition, the Roc mounts a varied assortment of bombs in special racks mounted below the center section. On enemy fleet missions it carries a single 800 pound bomb, the disposition of which is achieved by spectacular dive-bombing practice. During regular cooperation duties, various sets of bombs are arranged, from four 100 pound to 10 25-pound bombs. In addition to the deadliness of these missiles, in the diving attitude the pilot can also unleash his four wing guns making the Blackburn Roc a wicked customer to deal with in a vertical dive.

DIMENSIONS.—The Blackburn Roc has a wing span of 46 feet 2 inches and is 35 feet 7 inches long. It has a height in the "in flight" position (including the aerial mast mounted between the two cockpits) of 14 feet 2 inches. With the wings folded it is only 15 feet 6 inches wide, making it ideal for carrier storage. The landing gear track is 9 feet 7 inches. In the "three point" position it is 34 feet 10 inches long and 12 feet 9 inches high. The wing area (including ailerons) is 312 square feet. The two diving flaps have an area of 18.5 square feet and the vertical tail surfaces 49 square feet. The horizontal tail surfaces have an area of 73 square feet. The rudder has an area of 9.9 square feet. The propeller has a diameter of 11 feet, 6 inches.

WEIGHTS AND LOADINGS.—The Blackburn Roc has an empty weight of 5,490 pounds. It carries a military load (including fuel, oil, equipment and ammunition) of 1,381 pounds giving it an all-up fighting weight of 6,871 pounds. This gives the ship a wing loading of 22.0 pounds per square foot and a power loading of 9.24 pounds per brake-horsepower, extremely low for a service ship in both cases.

PERFORMANCE. — The Blackburn Roc has a maximum speed in level flight of 225 miles per hour at 6,500 feet and a maximum speed at sea level of 204 miles per hour. It has a landing speed of 75 miles per hour with flaps lowered. The service ceiling is 20,200 feet with the moderately super-charged Perseus and a maximum cruising speed at 15,000 feet of 187 miles per hour. Its most economic cruising speed at 15,000 feet is 145 miles per hour, which gives it a range of 1,180 miles.

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Flash News

(Continued from page 34)

Request for 412 volunteers to be sent to Fort Benning, Georgia, for training as parachute troops has been issued by the air corps. Extra pay and unusual chances for promotion have been promised. Men must have seen at least one year's service and must have at least one more year to serve (thus eliminating draft recruits).

A recent agreement was made whereby the War Department is to award all contracts for motors to the Wright Aeronautical Corporation and the navy to Pratt & Whitney Aircraft Corporation. Under the terms of this agreement the War Department has signed a contract with Wright for 7,500 Cyclone single and double-row engines at a cost of $119,870,920. A portion of these motors, however, will be used by the navy, payment for which will be made to the War Dept.

Six men were killed, two are missing and eleven men escaped injury in the air corps new step-up training program. First Lieut. James E. Mather and Private H. C. Lloyd were killed when their Northrop A-17 attack plane crashed into a rugged peak of the Wasatch Mountains near Alta, Utah. They were on a training flight from the Fifth Air Base Group at Fort Douglas. Lieutenants George Nelson and Roy V. Jones were killed in the crash of a North American 0-47A observation machine of the Washington National Guard near Fort Lewis. Two unidentified air corps reserve officers were killed when their North American BC-1A combat plane crashed and burned in a field near Dewey, Illinois.

Lieutenant Volney R. Stiles and Lieutenant Nathan H. Samuels are still missing on a reconnaissance training flight from the Air Corps Reserve base at Oakland.

Seven army flyers from Hickam Field, T. H., escaped death when their Douglas B-18 twin-engine bomber caught fire and crashed in a sugar-cane field near Honolulu. Pilot was Lieut. J. V. Edmundson, others aboard were Lieuts. L. R. Bratton and Kenneth Bushnell; Tech. Sergt. Homer Wood and Privates Robert Dohrow, Robert Mallory and W. E. Finlay. Second Lieut. C. G. Ferran received a ducking in San Francisco when his Stearman PT-13B training plane developed motor trouble. He leaped as the ship struck the water and was forced to tread water for two hours which he managed despite his heavy flying clothes and parachute. Captain Lester G. Orcutt fell out of his BC-1A training plane while flying upside down and watched it crash in a field as he floated earthward.

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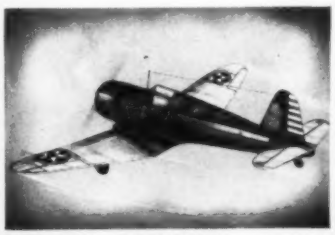
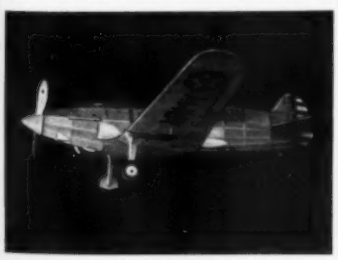
SPARKY—A streamlined, high-flying winner! We can't begin to describe its many amazing features—but it's a honey! Plenty of rubber. Designed by Ed. Lidgard. 32" wingspan. KIT No. L10 .....**50c**



VOUGHT FIGHTER — A swell model of a fast military plane; shock-absorbing landing gear, movable controls. Completely detailed, built-up engine, gun troughs, semi-finished prop. 33½" wingspan. KIT No. L9.....**50c**



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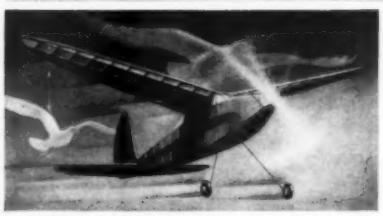

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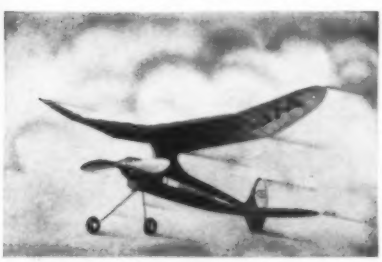

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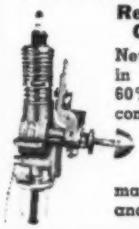

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